97TH YEAR

AUGUST 1955
Vol. 182 — No. 8

AMERICAN Gas Journal

LIBRARY OF CONGRESS
AUG 30 1955
SMITHSONIAN DEPOSIT

Question:

WHAT WILL SELL MORE GAS RANGES AT HIGHER PROFITS?

Answer:

Robertshaw® TIMER CONTROLS!

LIBRARY OF CONGRESS
SERIAL RECORD
SEP 19 1955
Copy

How do we know?

Because the WOMEN of America say so!

Through an independent research organization, Daniel Starch and Staff, women in every walk of life were asked about their attitudes toward Potwatcher and Temp 'n Time controls.

THE RESULT: WOMEN WANT THEM! 9 out of 10 women want *both* controls. 6 out of 10 say that these controls make other ranges obsolete. 6 out of 10 say they would buy a new range *sooner* if equipped with *either* of these controls.

AND... women value the convenience and performance so highly that *they would expect to pay $15 to $25 MORE* for a range so equipped.

YOUR OPPORTUNITY: Win new customers faster by featuring ranges equipped with Potwatcher and Temp 'n Time automatic controls.

WRITE TODAY... for sales' sake!... for list of manufacturers featuring these controls on their Gas Ranges.

Robertshaw®
POTWATCHER®
Top Burner Control

Robertshaw®
TEMP'N TIME®
Oven Thermostat and Timer Control

MR. CONTROLS

Robertshaw-Fulton
CONTROLS COMPANY

Robertshaw Thermostat Division, Youngwood, Pennsylvania
Robertshaw-Fulton Controls (Canada) Ltd., Toronto

Select the controls that help you sell-

Boost Summer Sendout with Servel "add-on" gas-fired cooling units!

Summer's dog-days are here . . . in full force. And that means you have a ready-made supply of customers to solve your low-load problems.

Your present forced-air heating customers are good prospects for Servel gas-fired "add-on" cooling units. They'll really be interested when they see how easily, how inexpensively, this unit can be attached to their present system.

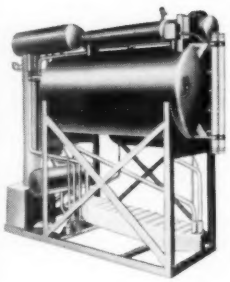
With Servel "add-on" units on your lines, *you'll* benefit, too. Sendout tends to equalize through the year. And your profits will go up, without increasing your winter peak or capital investment.

Take advantage of the huge demand for cool, comfortable summer living. Push Servel "add-on" units on your lines. Write for sure-fire promotion plans. SERVEL, INC., Dept. AG-85, Evansville 20, Indiana.

Push Servel for bigger, better summer profits

Servel *All-Year*® air conditioners

Owners of these 2-, 3-, and 5-ton models are year-round customers. Servel **All-Year** units cool in summer, heat in winter . . . help take "seasons" out of supplying gas.



Servel water chillers

help commercial plants and institutions three ways. Provide customers with controlled chilled water for air conditioning, industrial cooling, and process cooling. Provide you with a steady, important volume load at profitable rates.

Servel

the name to watch for great advances in

AIR CONDITIONING ✓ REFRIGERATION

4 new extra values WITH American® Ironcase Meters

Year after year, *American*® meters cost you less to operate — assure you of maximum accuracy with least maintenance.

New flag rod and axle box grommet seals, now standard equipment in domestic Ironcase meters, are typical *extra values* developed through constant research for better materials, design and manufacturing methods.

For any application of metering equipment, you are sure of the best when you buy American, the only *complete line* of precision instruments to assure you of "sustained accuracy at lower cost."

NEW composition axle box grommet seals prevent leaks and reduce friction to a minimum . . . no measurable leakage after millions of cycles. Unique design provides greater sealing ability at increased pressures—with no sacrifice in friction.

NEW composition flag rod grommet seals provide uniform, minimum friction and assure dependable, positive leak protection . . . sealing ability unaffected in normal vapor service with natural, manufactured or LP gas.

NEW plastic Index Box is easier to read—equally suitable for exterior or interior meter settings. Molded in one piece, the new box is impact and shock resistant . . . unaffected by ordinary exposure to the elements. Standard on all 3B, 5B and 10B Ironcase and 5B/225 Aluminumcase Meters.

NEW molded Duramic diaphragms developed and produced by American for applications requiring a rugged, composition material . . . provide years of trouble-free service.

New Meter Connection Package— Greater convenience in identifying, handling and storing meter caps and swivels with American's new packaging. These parts are now packed in small unit cartons contained within a master carton, labeled for ready identification — replacing barrels formerly used.

AMERICAN METER COMPANY

GENERAL SALES OFFICE: 1513 Race Street, Philadelphia
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IN CANADA: Canadian Meter Company, Limited, Hamilton
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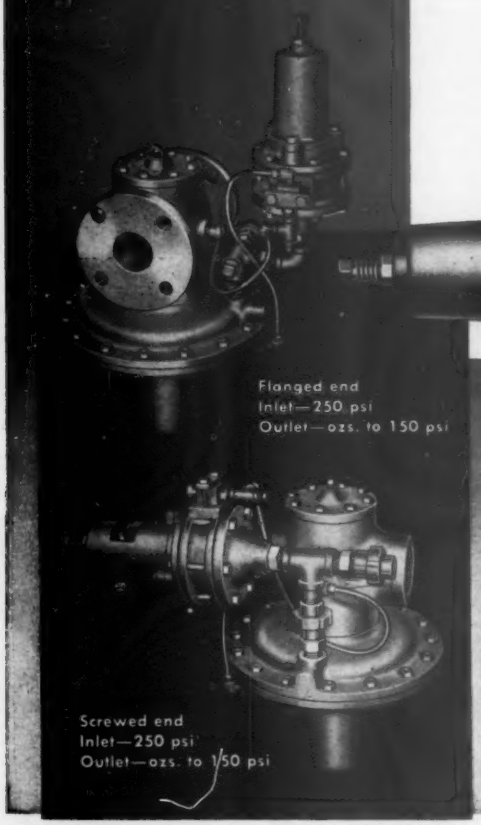
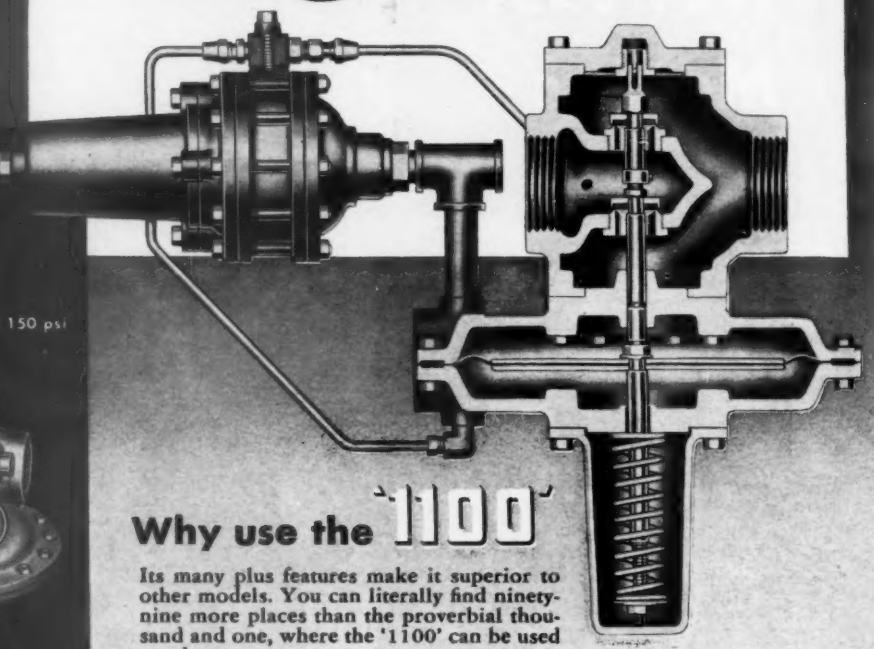
Chaplin-Fulton

why? '1100' regulator





Why use the '1100'

Its many plus features make it superior to other models. You can literally find ninety-nine more places than the proverbial thousand and one, where the '1100' can be used to advantage.

One basic assembly-2"-screwed or flanged.

- **WIDER APPLICATION**—inches water to 150 psi controlled pressure—means less different types to stock and service.
- **GREATER CAPACITY**—balanced valve construction passes 114,000 CFH at 100 psi to ounces—replaces larger costlier regulators to reduce cost of whole installation.
- **PROVEN PERFORMANCE**—straight line control from minimum to maximum flow. Stable operation on quick changing loads, or with on-and-off controls. Fast low lock-up on zero flow.
- **SIMPLER CONSTRUCTION**—no intricate parts or delicate adjustments. All wearing parts easily replaced. Regulator or pilot can be serviced without disturbing the other.
- **EASIER INSTALLATION**—compact design requires little space for installation in any position. Just place in line and make one connection from regulator to outlet line.

ACCURATE CF MFG CO DEPENDABLE

Chaplin-Fulton

MANUFACTURING COMPANY

Pittsburgh 36, Pennsylvania

Bulletin 1100 with complete information sent on request.

54-1100

AMERICAN
Gas Journal

VOLUME 182 | 97TH YEAR : : AUGUST 1955 | NUMBER 8

This month...

EFFECTIVE USE of television by Philadelphia Gas Works is highlighted for us by John F. Short. The company has a 5-a-week program that is spotted in an excellent time period. Audience reaction has been obtained and reveals not only concentration of attention but high favor. There is more than a little gratification to PGW in the audience ability to name the products that have been shown. Page 43.

OLD DAYS in the gas industry, as we have recalled them from 1865, 1905 and 1930, have been welcomed back to GAS JOURNAL by a surprising number of readers with interest in the turning of the wheel of history. We shall strive to select items with laughs, chuckles or smiles of personal recollection. In the later years, as might have been noticed, we gravitate to names . . . some still with us, others well-remembered. Page 31.

COMPETITION will be with us forever, we hope, for the values of the advancements which must be made to stay in the running. It is a rare moment, however, when word from the electrical industry has the effect of giving high praise to the gas industry. Such a moment came this hot August and we would be remiss in our gas industry responsibilities if we omitted our comment. Space limitations and the matter of copyright laws preclude our publishing the electrical industry's words. However, personal requests to the Editorial Director, in New York, probably will be favored with the full text that occasioned our Editorial. Page 9.

Contents

Mcf	4
Editorial — Can We Make It Only the Beginning?	9
Plastic Pipe Proving Profitable	10
Automation in Action — *Ernestine Adams*	14
Performance Test for Gas-Fired Wall Heaters	18
Gas Industry Construction Expanding	20
How High Temperature Jets Are Utilized in Some Industries, Part 2 — *James B. Henwood*	22
Industrial and Commercial Gas Sales Conference — Conclusion	26
Gas Industry Statistics	
Price Indexes: Gas, Other Fuels and Electricity	28
Sales Indexes: Gas and Electricity	28
Shipments: Residential Appliances	28
Index of Yields: Selected Utilities Stocks	28
Economists Point to Dangers in Rate of Increase in Consumer Debt — *John F. Falvey*	29
Courts Have Handed Down Varying Decisions on Utility-Extension Demand — *Leo T. Parker*	30
Old Days Recalled	31
Gas Industry News	32
Gas Industry Personals	36
New Gas Industry Equipment	38
Gas Industry Calendar	42
American Gas Merchandising: TV Show Sells Gas and Appliances — *John F. Short*	43
New Compact Device That Makes Appliance Demonstrations Easy	44
Gas Appliance Industry News	46
Men at Work	47
Index to Advertisers	48

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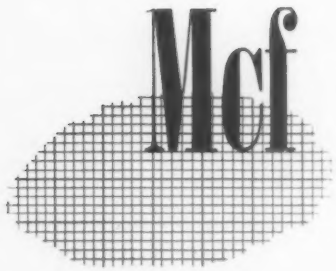

PASSAGE of FPC-exemption bill for natural gas producers, in House, with no action by Senate, has left eventual enactment a more elusive question than ever—for pros and cons.

WASHINGTON observers come up with "competent" opinion, quoting with names attached, that says favorable Senate action is expected. And there is no scarcity of equally-rated opinion that gives the Senate bill little or no chance.

CONSUMER-interest groups, one led by Philadelphia's Mayor Clark, will use interim to best advantage. And like-minded Senators, such as Douglas (D., Ill.), Kefauver (D., Tenn.), and Morse (D., Ore.), can be expected to ready filibuster tactics.

REMINDER: 1956 includes a presidential election, with its rather obvious implications for the gas bill.

PRODUCERS certainly will not recess their activities until Congress reconvenes. One well-placed opinion says there is surprise Harris bill reached House floor during last session.

FPC has been left in bad spot by lack of final action.

BILL will not be cure-all, if passed. Some provisions and terms are vague and would require definitions that can come only from combination of FPC rulings and court decisions.

CRITICISM of FPC, resulting in an organizational investigation by House Small Business subcommittee, drew a blank. Influence by White House, Bureau of Budget and Wall Street was line followed by committee counsel in questioning. Even former and unlamented FPC Chairman, Leland Olds, couldn't come up with definitely unfavorable reactions that appeared to satisfy counsel!

PACIFIC Northwest natural gas project is still thrashing around something fierce, with FPC proceedings that seem to revolve mainly around California and Nevada matters rather than those of Washington and Oregon.

CONNECTICUT Gov. Ribicoff vetoed bill that would have permitted minority group of stockhoulders to put through mergers of utilities. He insisted historic ⅔-vote should stand.

MID-1955 found construction industry still operating at record levels, with no downturn in sight, says F. W. Dodge Corporation.

UTILITIES are now running tests on 34 of Coleman's gas motor air conditioning units. Credit for advancing this development by full year is given to cooperating utilities by Sheldon Coleman.

GROSS National Product was at record $383-billion annual rate in second quarter. If rate of gain over 1954, about 7 per cent, were maintained, GNP would double every 10 years.

MERGER apparently upcoming in appliance industry involves Whirlpool Corp., Seeger Refrigerator Co. and RCA Estate. Cleared by Justice Department, it will now be presented to stockholders. Resulting company would be Whirlpool-Seeger Corp.

REMEMBER Gas Journal editorial ("No Laughing Matter" Oct., 1954) looking toward atomic electric plants? Particular reference was to New England . . . drew snorts from highly placed gas executives. Niagara Mohawk put atomic power in its lines last month.

ECONOMICS of atomic electric plants not yet on competitive basis, AEC Chairman Strauss said at dedication of new facility. But, we can expect technologists to keep everlastingly at that matter of economics.

DEVELOPMENT credit corporations are subject of study by Guaranty Trust Company's *SURVEY*. Says "credit corporations are designed to fill a financial gap that seems to have been created, in part at least by heavy taxation." Banks, insurance companies, business organizations and individuals have cooperated in establishing the corporations to make private capital more readily available to small business.

THUNDERBIRDS, in Junior version, will be prizes for kids in consumer-contest run by Norge division, Borg-Warner Corp., starting next month. Battery-operated cars will travel kid winners at 5-mph.

CENSUS of business is expected to reveal an eye-opener, with Nation's industrial development rocketing upward at faster pace than originally predicted.

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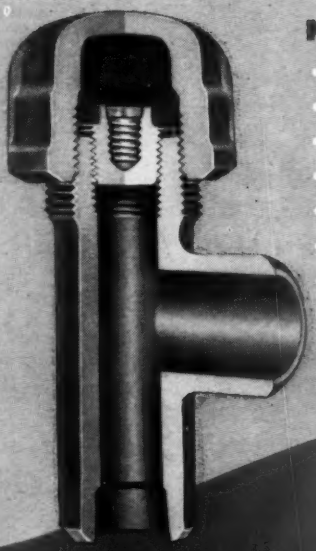
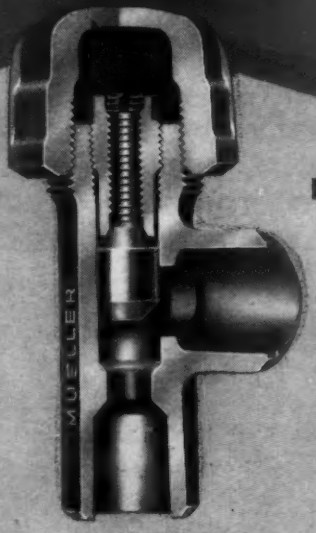
MUELLER®



NO-BLO® SERVICE TEE

- Installed under pressure
- May be stopped-off at any time
- Activated with "E-4," "D-4," or "T" machines
- Welding or threaded inlets
- Welding, threaded or Dresser outlets
- Cast iron cap for pressures to 250 p.s.i.
- Steel cap for pressures to 1200 p.s.i.
- Outlet sizes from ¾" through 2½"

Dependable Main-to-Service Connections!



NO-BLO® VALVE TEE

- Installed under pressure
- Valve seats in "open" and "closed" positions
- Differential threads develop powerful seating force
- Make stop-off with screwdriver and wrench
- Installed with "E-4," "D-4," or "T" machines
- Renew valve seat under pressure
- Welding or threaded inlets
- Welding, threaded or Dresser outlets
- Available with cast iron or steel cap
- Outlet sizes of ¾" through 2"

See your Mueller Representative, consult your Catalog G-97 or write direct today for full details and specifications.

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Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

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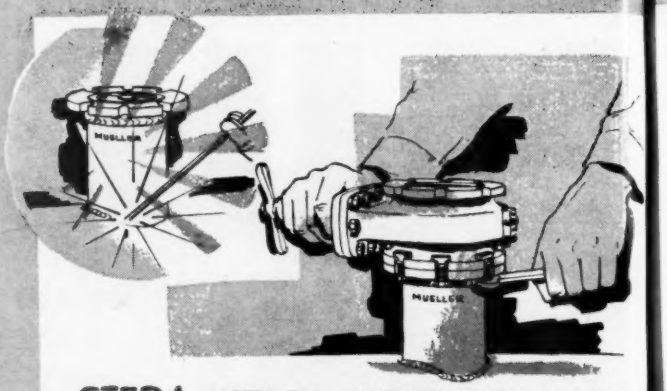
Method

with Save-A-Valve

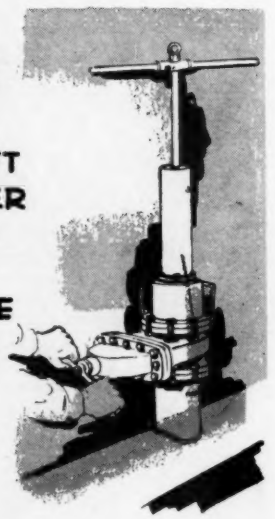
SAVES VALVES ON TEMPORARY CONNECTIONS SAFELY...

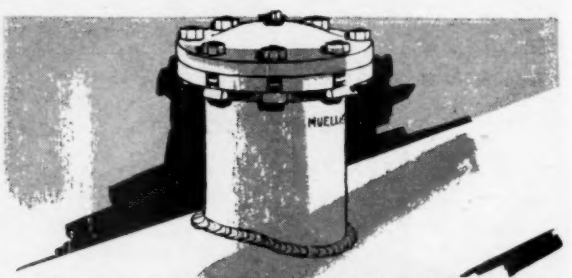
This is another of a series showing the broad application of Mueller No-Blo Fittings and Machines used for their installation.



STEP 1. WELD! WELD DRILLING NIPPLE TO LINE OR TANK. REMOVE PLUG, BOLT TEST CAP IN PLACE — TEST. BOLT MUELLER GATE VALVE TO NIPPLE.

STEP 3. ABANDON! CLOSE VALVE AND REMOVE LINE. ATTACH PLUG TO SHAFT OF PROPER MUELLER COMPLETION MACHINE, BOLT COMPLETION MACHINE TO GATE VALVE, OPEN VALVE AND SCREW PLUG INTO NIPPLE.

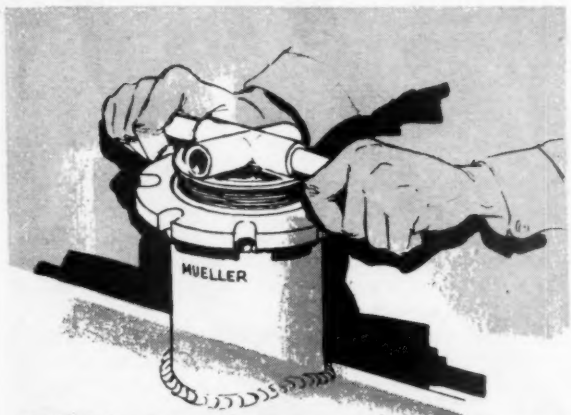




STEP 5. COMPLETE! PLACE GASKET IN FLANGE RECESS OF NIPPLE AND BOLT COMPLETION CAP SOLIDLY IN PLACE. ABANDONMENT IS NOW COMPLETE AND VALVE HAS BEEN SAVED FOR RE-USE.

STEP 2. CUT! BOLT MUELLER C1-36 DRILLING MACHINE TO GATE VALVE AND MAKE CUT. CLOSE GATE VALVE, REMOVE DRILLING MACHINE AND ATTACH TEMPORARY LINE.

Drilling Nipples



STEP 4. RECOVER! REMOVE MACHINE AND RECOVER GATE VALVE. TIGHTEN PLUG WITH WRENCH PROVIDED.

STEP 6. RE-USE! REMOVE CAP AND LOOSEN PLUG. ATTACH EXTRACTING TOOL TO PLUG, BOLT GATE VALVE TO NIPPLE AND MACHINE TO VALVE. ADVANCE SHAFT TO ENGAGE TOOL AND UNSCREW PLUG. REMOVE MACHINE AND ATTACH LINE.

Mueller Save-A-Valve Drilling Nipples are ideal for making temporary or semi-permanent connections to any line or tank. Connections are quickly made under pressure with no blowing of gas or other fluid.

The exclusive No-Blo® Completion Plug—with "O" Ring Seal and pressure equalizing valve—makes it possible to abandon the connection *without* abandoning an expensive gate valve. The plug effectively holds the pressure while the gate valve is removed and the nipple sealed with a cap. The connection may be re-used at any time.

Flanged type Save-A-Valve Drilling Nipples are available with welding inlets—contoured to fit pipe one size larger than nipple—in nominal sizes 4", 6" and 8". Smaller nipples with threaded caps are available with welding or threaded inlets in nominal sizes from ¾" through 3".

For additional information and full specifications on Save - A - Valve Drilling Nipples, see your Mueller Representative, Catalog G-97 or write direct.

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Dependable Since 1857

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Field forces are always within earshot with Bell System mobile facilities

You get the most efficient use of company vehicles when you can reach your maintenance crews by telephone at any time. The Bell System offers several types of Mobile Radio arrangements.

General Service: Your fleet can be reached from any telephone. Also, your field forces can call any telephone reached by the Bell System.

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Private Mobile Systems: Radio equipment will be provided and maintained for eligible radio licensees. You get the advantages of Bell System engineering, installation and maintenance experience.

Mobile communications can be engineered to meet your specific requirements. For a free survey of your needs, simply call your Bell Telephone representative.

BELL TELEPHONE SYSTEM

TELEPHONE TELETYPEWRITER MOBILE RADIO
TELEMETERING AND REMOTE CONTROL CHANNELS

Editorial . . .

Can We Make It *Only* *The Beginning?*

AN AUGUST EDITORIAL often has been said to be as dead as a smoked mackerel, even before it is written. We've just read the typically-able effort for the month by another wordsmith and, indeed, it's filled with sparks—sparks that should ignite higher enthusiasm in and for the gas industry.

For our part, we have sincere appreciation to Brother Lawrence Wray for his full-page editorial, "Gas Has Got It—Promotion!" in *Electrical Merchandising*. "The gas industry," he concludes, "pulls no punches—only the electrical industry's."

There were any number of incredulous gulps in the process of reading Mr. Wray's evaluation of the results of gas industry promotional efforts . . . and some of the electrical industry's internal situations.

NOW, with the view that, in forthright competition, it is the very best strategy to heighten attacks on the adversary's clearly-discernible weak spots, we take a position on the points that seem to be bothering at least one electrical industry observer.

Promotion of gas as a fuel. The effects of the broad-fronted programs by American Gas Association, Gas Appliance Manufacturers Association and Independent Natural Gas Association of America are STARTING to be felt. When the electrical industry has any opinion on that promotion that says, "the gas industry is running with the ball and taking the public spotlight," it seems almost elementary to advise redoubled effort from this point.

Exhibits and conventions. About one recent convention show, the report was that "the exhibits literally reeked with gas." And, the reference was not to over-odorization! Happily, we can note here that GAMA has just approved an extensive list of trade shows for gas appliances and equipment, so those and AGA's New Freedom Kitchens will continue the snowballing effect that our distinguished electrical counterpart regards as pretty sad—for the elecrical industry.

Motion pictures and television. This is a hard-hitting-and-hurting effort by AGA and GAMA, in Hollywood, that rates nothing less than the loudest cheers for the gasps it draws from the Kilowatt Crowd.

Cabinet displays. When AGA is described to the electrical industry by a cabinet manufacturer as taking over in arranging for utility displays and tie-in promotion, advertising and publicity, we'd say that's the equivalent of an oak leaf cluster.

Combination companies. If we didn't know better, we'd pause to shed a tear for the combination companies. We've listened to a lot of wordage by straight gas utility executives on the dominating position of the combination companies in the gas industry, particularly in AGA's work. Those companies, our commentators invariably say, hold back gas to forward their electrical operations. (We set our thinking on the track, recently, by getting authoritative chapter-and-verse information on the subject. With no lack of respect for our friends' opinions, we're convinced there's nothing to it—definitely nothing.)

But, the nearly-tearful state was reached when we noted that electric utilities were terribly handicapped by the combination companies which were described as decidedly hampering Edison Electric Institute in promoting electrical appliances. EEI is a house divided, according to the keen observer in our opposite number, and is tied to the gas industry's apron strings!

There is no psychologist on our staff (nor psychiatrist), but we don't need one to become aware of the big danger in the "kind" words said about us by our truly powerful competitor in the sale of fuel and the appliances and equipment that utilize our fuel. That one-worded danger: COMPLACENCY. No gas industry individual, from a-to-zed, can afford the dangers of infection by complacency. Neither chloromycetin nor any other antibiotic will kill that virus.

AND, the electrical industry comment was an over-all comment—it cannot be interpreted as applying to every manufacturer and to every utility in the gas industry.

If we isolate the danger, with full effectiveness, then we can look at the electrical industry opinion that "the gas people . . . are waging the more spirited campaign to educate the public" as the most convincing incentive to make the efforts to this point—ONLY THE BEGINNING.

That will require truly industrywide and most unselfish dedication to the job of pushing every gas consideration to new heights—with research, coordinated plans, full-powered action . . . and, please excuse the word, *money*.

AUG 2 5 1955

SGA Panel Members Give Details

Plastic Pipe Panel members are, left to right, R. M. Curry, division manager, Pioneer Natural Gas Company; F. J. Guice, chief engineer, Mississippi Valley Gas Company; A. D. Simpson, Jr. (moderator), chief engineer, United Gas Corporation; Carroll Diller, assistant superintendent, construction and maintenance, Arkansas Louisiana Gas Company; Charles B. Gamble, Jr., vice president, engineering, Alabama Gas Corporation.

Plastic Pipe Proving Profitable

F. J. Guice, *Chief Engineer:*

● A SPECIFIC AREA that had no gas service and was remote from the existing system was selected for our experiment and study with plastic pipe. It held a potential of approximately 250 customers, practically all of whom were using butane. It was an uncongested area in which former attempts to serve utility gas by conventional methods had proved to be highly uneconomical.

"This Mississippi Valley Company experiment utilized plastic pipe underground and steel pipe aboveground. The material used was virgin cellulose acetate butyrate. Rural-type regulators were used.

"Miscellaneous non-standard, obsolete, or over-stocked materials were used for such facilities as meter risers, valves, and compression couplings. The plastic pipe was 2.25 in. OD-2.00 in. ID and 1.05 in. OD-0.90 in. ID. Tape-type wrapping, dielectric, was used on steel-to-plastic couplings, valve installations, and buried steel pipe and fittings.

"The town in the Mississippi Valley Gas Company test was divided into 3 sections with valves that would isolate each section. The design pressure was 60 psi ultimate and 25 psi present operation. Codes for distribution system piping were adhered to throughout. Molded plastic pipe fittings were preferred."

Construction Methods

"The pipe must be assembled aboveground, using pipe having 90 deg ends. Tight pipe-and-fitting connections are essential. The pipe should be buried and allowed to settle a bit before it is tied in for service. Backfilling must be done with extreme care to avoid mechanical damage to the plastic pipe.

"The solvent used for the experiment was 50 per cent acetone and 50 per cent butyl acetate with some of the virgin cellulose acetate butyrate dissolved in the mixture to make cement. Acetone was used as a thinner for the cement.

"The cement is applied liberally and is scrubbed on both surfaces of the joint with a relatively soft camel's hair brush. After the joint has been completed, additional solvent is brushed on the visible points of contact.

"Construction difficulty and possibly many future failures may be expected from lack of familiarity with the material by construction crews. Presumably as more experiments are carried out these definitely will be minimized. Many difficulties in the Mississipp Valley installation are traceable to improper tolerances in manufacturing.

"Another point of difficulty was found with rough pipe edges after sawing and also from insufficient use of the cement. There was some difficulty also in joining long sections of pipe aboveground after preceding sections had been placed in the ditch.

"As to expansion, the coefficient of linear expansion is approximately 12 times that of steel under similar temperature conditions. This has caused, however, no difficulty after 8 months of operations, including a winter season. There has been no effect apparent from the sun, but it was found that all plastic materials should be at the same temperature when assembled. Of course, there is relative difficulty in locating the pipe after it has been buried, so precise mapping is essential.

"This test system is installed in the worst soil on earth. The ground splits open and there may be trouble during dry seasons.

"The testing procedure followed was: Five joints were tested at 100 psi; 4000 ft were tested at 100 psi, from 10 minutes to 1½ hours. Finally, there was an overnight test at 100 psi. During the test, a number of couplings were lost, and there is an indicated need for applying a temporary bull plug.

"The company measured the public reaction and found there was widespread curiosity, with some observers fascinated and some concerned. There was, however, no indication of adverse reaction. As nearly as could be determined, the employee reaction was excellent, with widespread curiosity and eagerness to work with the material as soon as the test system has proved itself.

"Manufacturers of plastic pipe materials and fittings should maintain a high grade and take a closer look at tolerances. Also, the features of safety should be tested thoroughly and manufacturers should provide adequate range of fittings. In addition to those points leading to standardization, the requirements for installation—construction methods and adequate testing procedures—should be investigated by the industry and developed to a point of standardization.

"In conclusion, plastic pipe definitely has a place in gas distribution. Mississippi Valley now has a system serving approximately 200 customers and using approximately 30,000 ft of plastic pipe. The company is now planning to use another type of plastic to expand the first-hand knowledge of the material. This should not be construed as a con-

AMERICAN Gas Journal FEATURE

demnation of cellulose acetate butyrate." The present system is tight, and the company reports that there has been no unaccounted-for gas.

Charles B. Gamble,

Vice President:

● ANY CHANGE in the type of material or product being used for a particular service should be dictated by a balance between the economic advantages or disadvantages resulting from the change and the physical advantages or disadvantages.

"In the case of Alabama Gas Corporation, the comparison has been made between the use of millwrapped steel pipe of minimum commercially available wall thickness and plastic pipe with wall thicknesses substantially coinciding with those recommended by American Gas Association's distribution committee.

"As a matter of background, it is necessary to realize that Alabama Gas' system is not under severe corrosive attack, as indicated by a present maintenance and replacement cost of pipe under attack by or deteriorated by corrosion of less than 0.5 per cent per year of the current value of the system. The system is estimated to have an average dollar life of about 20 years.

"The principal advantages of plastic pipe as material for construction of mains and services appear to be:

"1. It is lighter in weight, which minimizes the use of handling equipment particularly in the larger sizes, perhaps 4 in. and above.

"2. It is resistant to corrosion in the ordinary sense of the word although it would appear there are little actual data to show that plastic material will not deteriorate with age.

"3. Joining by means of solvent welding appears simple as contrasted with the usual methods of joining steel pipe by welding. But, at least 2 other members of the panel seem to indicate that solvent welding is not as simple and foolproof as I had been led to believe.

"On the other side, the disadvantages as compared to steel pipe appear to be:

"1. The lack of standard methods of testing, which at present throw considerable doubt upon the actual strength of the available material.

"2. The actual lesser strength of plastic materials, as evidenced by published data, as compared with the strength of steel pipe. Calculations indicate that after taking account of the internal stresses that might be imposed by internal pressure, by contraction due to temperature change, and by earth loads under the most favorable conditions, the remaining available strength of plastic pipe to take care of unusual conditions of soil or traffic stress is less than 15 per cent of that of steel pipe.

"Considering the physical characteristics as well as the comparative material costs involved in the use of plastic and steel pipe, it has been our conclusion that:

"1. The use of plastic pipe in sizes of 1¼ in. or less for new services as a substitute for millwrapped steel pipe would result in a slight increase in installed cost.

"2. The use of plastic pipe for the installation of mains in sizes 2 in. and 3 in. as a substitute for steel pipe would result in no material change in installed costs provided adequate volume could be obtained to avoid the necessity of carrying duplicate inventories.

"3. That the use of plastic pipe for the installation of mains in 4 in. and 6 in. sizes would result in some slight decrease in installed cost.

"Contrasting the lack of any decided

WELDING PLASTIC TEE AND PIPE

Procedure followed by Mississippi Valley Gas Company

FIG. 1. The plastic tee and the equipment necessary to install it.

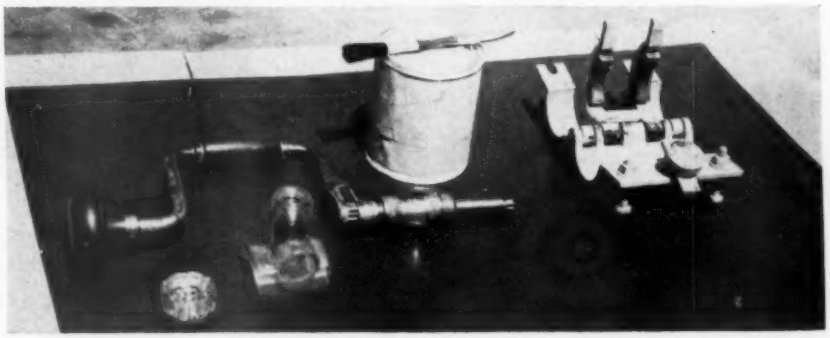


FIG. 2. Applying the solvent cement to the tee.

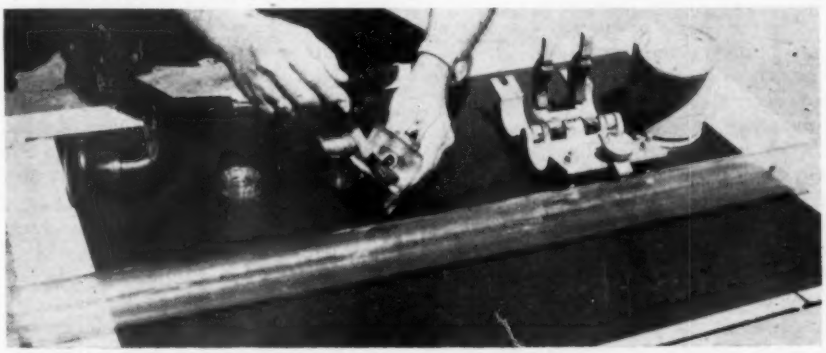


FIG. 3. Here, the tee is in place ready to be held in the clamping device. Note the upturned fingers of the clamp, which will be lowered into place.

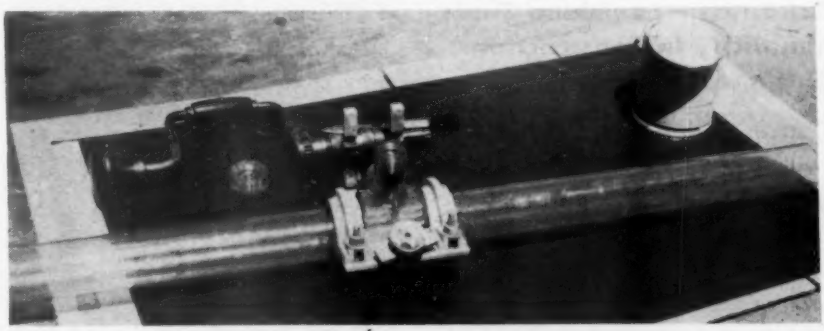


FIG. 4. The tee in the clamping device. Approximately 20 minutes will be required for the solvent in the cement to evaporate and complete the weld.

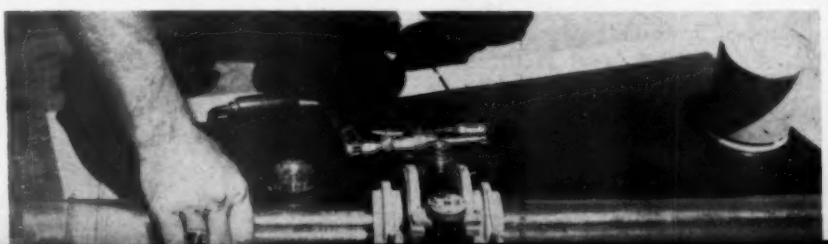


FIG. 5.

FIG. 6.

FIG. 5. The clamping device has been removed, and the tee is ready for drilling.

FIG. 6. A carpenter's brace is used in drilling the tee. An internal pilot drill, coupon extractor, or shell cutter aid in completing the drilling operation.

FIG. 7. The tee here, is ready for installation.

Photos Courtesy of Mueller Company

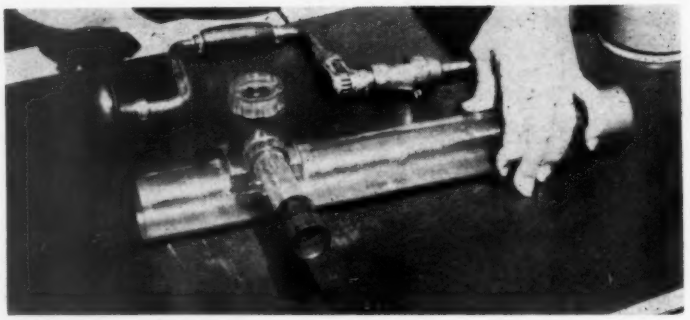


FIG. 7

economic advantage in the substitution of plastic for steel pipe in the construction of new mains and services with its very decided physical disadvantages, we have concluded that, for the present, we will not attempt any new installations using plastic materials.

"In the course of our analysis of the possibilities of the substitution for new construction, we have determined, however, that there is a very marked advantage in its use as a replacement for its existing service lines, using the old service as a casing for the new plastic pipe and thereby avoiding the necessity of boring under streets or even ditching across them. Therefore, we have made a limited number of installations of this type, the oldest of which has been in the ground approximately 4 years. Up to the present time, we have experienced no problems."

Arkansas — Louisiana Finds Simplicity in Construction A Big Advantage

Carroll Diller,
assistant superintendent

● "THE LATEST CHAPTER in the long search for a material for use in underground gas distribution systems that is less subject to corrosion involves the use of a thermoplastic compound. The characteristics and physical properties of these synthetic compounds are readily available in the literature published by the manufacturers. These properties indicate that pipe made from these plastics meets most of the requirements for an ideal material. Many tests and experiments have been made to prove adequacy of this material.

"The flexibility of semi-rigid plastic pipe makes it particularly adaptable for renewing long service lines wherein the plastic pipe can be inserted through the old pipe, with this old pipe serving as casing. This flexible semi-rigid pipe has been used to a lesser extent for the installation of new services but should prove to be just as advantageous.

"Rigid plastic pipe is usually manufactured in 20-ft lengths. Its use for distribution mains in the place of steel and cast iron pipe has been on an experimental basis by a great many distribution companies. Ease of handling because of its light weight and the short length of time necessary for connecting joints and installing pipe in the ditch are some of the advantages of this pipe over pipe of other material.

"The acceptance of a new material such as plastic pipe can be brought about more readily by keeping the procedures pertaining to its use as simple as possible. The use of this pipe for gas distribution mains and services necessarily involves existing facilities. It is, therefore, considered more appropriate for the outside dimensions of the plastic pipe to conform with those of standard sizes of steel pipe in order that these tie-ins can be made with a minimum of trouble by using standard compression fittings instead of special adapters. The necessity of carrying an extra supply of fittings in warehouse stock will be eliminated.

"Service connections to distribution mains constitute one of the absolutely necessary functions in the operations of a distribution plant, therefore, any material that is used for mains must be such that these connections can be economically and efficiently made. All of the many manufacturers' representatives of plastic pipe who have been interviewed were forcibly apprised of this basic necessity. Many appeared to be unaware of this and promised to contact their designers to have them develop an acceptable service tee. Very few ever returned with any definite information.

"One manufacturer investigated and developed a plastic service tee that can be solvent-welded to the plastic pipe for use as service connections. These plastic tees are now available from a manufacturer of gas distribution equipment and fittings. As far as I know, this is the only plastic tee on the market. Because of his interest in our basic problem, this manufacturer has been the supplier of all the plastic pipe that we have purchased to date.

"The installation procedure involving the use of the semi-rigid plastic pipe for replacing old services is comparatively simple. A combination reamer and cleaner can first be pulled through the old pipe to give assurance that all is clear and that the plastic pipe can be installed without difficulty. The outside diameter of the plastic pipe must necessarily be slightly less than the inside diameter of the old service pipe. The new pipe can be tied into the existing facilities with reducer adapters especially made for this purpose.

"The 20-ft lengths of rigid plastic pipe, which are usually used for distribution main installations, are joined together over the ditch by means of a solvent and collar. Cementing these joints requires only a few minutes and can be done with unskilled labor.

"The backfilling of the ditch, after the installation of the plastic pipe, should be carried on with care. The first few inches of the backfill should be

made with finely divided dirt because large chunks of dirt or rocks could very easily damage the pipe.

"The use of the semi-rigid plastic pipe for replacing old service mains can result in considerable savings in material, in breaking of pavement, and excavation costs. Pavement replacement costs in most places have increased considerably in recent years.

"Our experience with the use of the rigid plastic pipe in 2-in. size on main installations has been generally favorable. We have installed approximately 1.6 miles in 7 different locations. An analysis of the costs shows that it costs slightly more than millwrapped steel pipe and slightly less than cast iron pipe. At one location, a 400-ft section was used as a replacement with very satisfactory results. The use of the plastic service tees in these installations worked out very well.

"The use of these various plastic pipes in gas distribution mains and services has proved desirable. The principle objection to the use of plastic pipe is thought to be its liability to damage in the ground from other excavation work. In many locations, the speed of installation offsets a higher cost of material. We feel that the major question concerning the use of plastic pipe concerns its length of life."

Pioneer Natural Connected With Extensive Customer-Owned System

R. M. Curry,
division manager

● "PIONEER NATURAL GAS COMPANY delivers gas to an uncommonly great mileage of plastic pipe owned and operated by its irrigation customers, but it has no first-hand experience with it.

In 1953, Pioneer began the expansion of its irrigation business, which, theretofore, had been confined to deliveries from its transmission lines to the individual irrigation farmer who was fortunate enough to have irrigated lands adjacent to the transmission lines. Under prevailing gas rates, the farmer with natural gas service had savings in fuel costs ranging from 40-67 per cent over butane and propane, the predominate source of pumping energy. These savings would justify construction of facility lines ranging from one-quarter to 2 miles in length, dependent on the farmer's demand for fuel.

"Under the prevailing rate structure Pioneer could not economically construct much line to serve irrigation wells directly. It was determined, however, that "irrigation feeder line" construction was tenable if farmers would join together and use joint facilities, commonly known as " group lines" for the distribution of gas from the "feeder line" to the several customers or wells.

"This program has had phenomenal growth. Pioneer has constructed 786 miles of "feeder line" and the customers have constructed, perhaps conservatively, 6 miles of group line for each mile of feeder line, aggregating no less than 4500 miles of line. Much of this facility is constructed of plastic pipe.

"The customer facility line, under the gas service contract, must be of minimum 2-in. ID pipe, regardless of length, if supplying an engine rated at 10 bhp or more; 1¼-in. pipe may be used for domestic service or for lesser engine loads. Deliveries are made to the customer at the lowest tenable pressure ranging from 8 oz to 50 psi.

"Company construction in the latter part of 1953 and early 1954 was in excess of 270 miles of feeder line, which thrust a parallel demand for somewhere in the neighborhood of 1200 miles of pipe on a market that was already short in supply.

"Under these conditions, plastic pipe manufacturers and distributors aggressively entered the market. Those entering the market ranged from the reputable manufacturer of sound financial position to would-be extruders who must of necessity enter the material market after gaining a sales contract.

"Sales of plastic pipe were made on 2 bases: Claims of satisfactory experience by West Coast companies in highly corrosive soils over a period of 8 years, and availability.

"Pricewise, at this time, plastic pipe was higher than standard steel pipe, but the laid cost was competitive and many contracts for plastic pipe lines represented to the customer not only immediate gas service but substantial cost savings as well.

"Under the insistence of both the supplier and the consumer, who often has contracted for or had actually laid in plastic line, to connect with plastic-pipe facility lines, Pioneer agreed to connect and deliver gas to plastic lines provided steel connections were provided for the company installations together with evidence of a satisfactory field pressure test.

"Obviously, Pioneer, which was and is without experience in the use of plastic pipe, was in no position to approve or disapprove the use of plastic pipe. To our knowledge, there were no reliable standards available, and we were in no position to evaluate the material and specifications, which were more numerous than the suppliers in the market, or the responsibility of the supplier. The policy adopted was simply that the consumer would have to determine for himself that he was satisfied with the plastic pipe suppliers' representations, and the company would have no interest. That policy is no different than that which has to do with suppliers of pipe manufactured of other materials.

"Approximately 130 miles of plastic pipe were laid in the early part of 1954 and have now had more than one year in service. Its operation has been, generally speaking, satisfactory. It follows that not enough time has elapsed for longevity evaluation.

"Some plastic pipe installations have not been satisfactory. To the best of our knowledge, these failures showed under pressure test and were specifically results of lack of installation knowledge or material failure.

"The lack of knowledge of construction was generally attributed to the use of weathered cement or solvent resulting in a bead at the joint. Such beads dissolved the pipe material leaving a thin section that blew out under pressure test. Contractors have apparently abandoned the idea that laying plastic pipe is an unskilled "Do it yourself" operation, and, of late, we have heard of few failures of this sort. Testing procedures have, from time to time, resulted in failures that were not due to basically poor workmanship. Backfilling has presented problems; some contractors now backfill with pipe under nominal pressure.

"Some of the most plaguing projects have resulted from over-testing. Under tests, other sections of the pipe were stressed before the first blowout and, subsequently, these sections failed under much lesser test pressures.

"Inferior materials have cropped up from time to time; sometimes these materials have been traced back to a faulty batch of material, and at others faulty processing and extruding were unquestionably responsible.

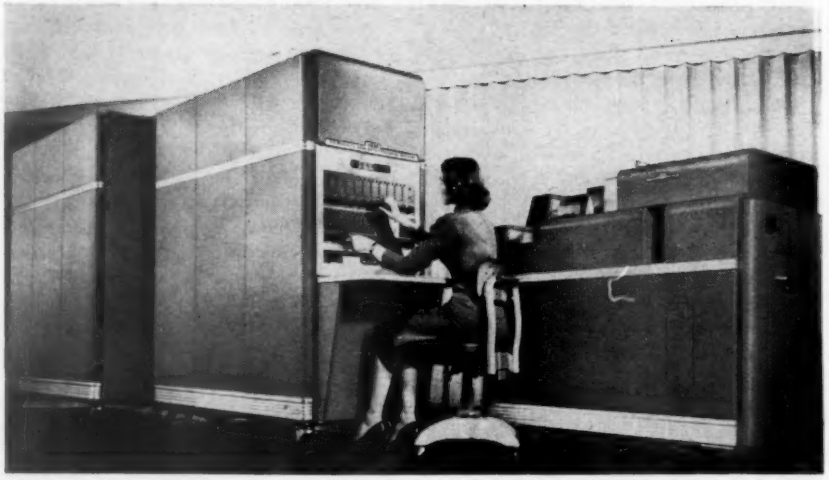
"We have, from time to time, tested samples of plastic pipe of various manufacture, to failure, under hydraulic pressure with widely varying results. A considerable lack of uniformity in material is evidenced.

"It should be remembered that at the beginning of these activities plastic pipe was offered in copper-tubing sizes and recommended for comparatively high working pressures. The extruders made a switch to iron-pipe sizes and in many cases to maintain competitive position produced a thin wall product that did not, in all cases, meet theoretical specification.

"Most of that which has been said has been critical; such experience is necessary and is conducive to the evolution of material and workmanship that will be entirely acceptable. Most of the fly-by-night extruders are now out of business, and it is apparent that better knowledge of materials and reliable standards will define the field of proper usage for plastic pipe in the gas industry." ★ ★ ★

Electro Data

Electronic computer is a new aid in all kinds of mathematical problems. Here punched tape carries facts for machine to analyze.



International Business Machines

This type of magnetic drum processing machine by IBM consists of drum and electronic calculating components housed in two separate cabinets, one with a console, and a third unit which provides input and output facilities. The machine has up to 20,000 memory positions to store data and operate instruments.

AUTOMATION *in Action*

Ernestine Adams*

A word hard to define but definitely around it has been making spectacular progress recently . . . Here are some personal, economic, and political effects it has on you . . .

THERE'S a new word being tossed about that appears to mean many things to many people.

The word is *automation*. The reason it is the subject of countless articles and panel discussions, two industry magazines, and several books is that it apparently affects everybody.

As a word automation's chief charm is that it is easy to say. Some people don't like it and hardly any two will agree on its exact definition.

Dictionaries haven't taken it up yet and there is some question about its originator — whether it was D. S. Harder, a Ford vice president, or John Diebold, a consultant on "automation".

What Is It?

Let's take a look at some current definitions just to get in the spirit of the movement.

John Diebold, mentioned above, found it hard to limit his definition to one automation so he describes two. One is "Detroit automation," or advanced mechanism, whose essential characteristic is "integration of machines with one another." His second automation is the growing use of automatic feedback control, and its chief characteristic is self-regulation.[1]

Bernard Eichwald, electrical engineer and contractor, calls automation the "automatic performance of a control system by mechanization instead of human force."[2]

Ira Wolfert in *Reader's Digest* calls automation a "technique by which machines now do more and more intricate jobs without human guidance."[3]

Peter Drucker, New York University, in *Harper's Magazine* says, "Automation can be defined simply though superficially as the use of machines to run machines."[4]

Walter S. Buckingham, Georgia Institute of Technology, in the *Monthly Labor Review* calls automation "a new technique based on communications and control."[5]

John I. Snyder, Jr., chairman of the board and president of U. S. Industries, Inc., states that what "most people mean by automation is the control of flow in a manufacturing process."[6]

Although some authorities emphasize its nature is *evolutionary, not revolutionary*, there is a widespread tendency to call the automatic communication control techniques the "second industrial revolution."

Harry M. Davis in *Scientific American* said, "The first phase of the Indus-

*Economics Editor.

1. "Automation—Its Application and Uses," address by John Diebold at the National Conference on Automation, Washington, D. C., April 14, 1955.
2. "Proper Plant Maintenance and Modernization," by Bernard Eichwald, given at a seminar, Young Presidents Organization, Phoenix, Arizona, April 4, 1955.
3. "What's Behind This Word Automation?", by Ira Wolfert, *Reader's Digest*, May, 1955, page 43.
4. "America's Next 20 Years," by Peter Drucker, reprint from *Harper's Magazine*, March, April, May, June, 1955.
5. "Industrial and Economic Implications of Automation," Walter S. Buckingham, *Monthly Labor Review*, May 1955.
6. "The American Factory and Automation," John I. Snyder, Jr., *Saturday Review of Literature*, January 22, 1955, page 16.

trial Revolution meant the mechanization, then the electrification, of brawn. The new revolution means the mechization and electrification of brains."

"By popular definition" states *Fortune* magazine, "the second revolution will replace man's sensory apparatus and brain—doing routine jobs—as the first replaced human (and animal) muscle power."[8]

"Automation," said President Eisenhower, "is just a new word for the kind of technological advancement that has been going on for 150 years."[9]

Stated an electronics engineer in the petroleum industry—There are two principal reasons why automation has come into prominence recently: (1) Error-sensing devices that are more specific in detection than those formerly available and (2) servomechanisms (muscles) that can utilize information from the sensing device in a much more subtle and efficient manner than heretofore possible.

In a *Fortune* round table, O. H. Schuck, Minneapolis-Honeywell, said, "The requirements are continually getting more complex. The demand for higher and higher performance forces us to greater automation just to make it possible for the human being to keep hold of the process."[8]

In other words, automation is a development of "parasensory" controls which may be said to cross the human-senses barrier as planes now pierce the super-sonic barrier.

What Does It Do?

There may not be a consensus concerning the exact meaning and extent of automation but no one denies its results. They have been spectacular.

Probably no one has taken more advantages of automation than the electric power industry. Plants turn out 5 times more electric power than 20 years ago with 15 per cent more workers.

7. "The Automation Factory," a *Fortune* Round Table, October, 1953, page 168.
8. Press Conference March 16, 1955.

Hot Rod Knitting

A pair of nylon stockings requires about 3 miles of filament yarn and 2,000,000 stitches on a high-speed hosiery knitting machine, which turns out, on the average, a pair every 3 minutes. If you could hand-knit the fine nylon yarn, it would take you almost 3 months of constant knitting at a rate of one stitch per second for 8 hours a day, to produce the same pair of stockings.

The above was taken from *American Magazine* for July. It would be interesting to figure out how many men and women in the United States would have nylon hose without the machine with superspeed.

In the natural gas field prices all along the line are kept down by automatic operations. A gas well can be drilled with some automatic equipment; compressor stations may be largely automatic; distribution headquarters usually have equipment that performs paper work, which saves a great deal of labor.

Stated Everett S. Calhoun: "Because of the increasing requirements of reports for government regulatory bodies, the clerical costs in utilities have risen sharply. In order to handle the mountains of paper work most utilities find that their employment consists of 25 per cent clerical personnel. The benefits of electronic data-processing systems, which in many cases will save 25 to 100 clerks, are fairly well assured."[9]

Some of these control instruments, as we pointed out, go outside human ability and can perform without human error. They raise the *quality* of service more than straight mechanization can do. Consolidated Engineering Corporation's annual report states: "The rapidly unfolding 'Age of Automation' is based upon recent technological advances which have made possible the creation of instruments and machines to supplement man's senses and brain power. Already, machines which sense more than fingers, see more than eyes, and move faster than minds, are making miracles common."

Through automatic equipment, industry can perform more efficiently, more accurately, and more rapidly. We are here concerned more with the personal, economic and political effect of the movement, however, rather than with technical advances.

What It Does to Labor

In Samuel Butler's *Erewhon* the machines of the country grew so strong that for self-protection human beings finally destroyed all but the simplest tools. This reflected the fear in Butler's time for machines. The fantasy was written in the days of Karl Marx who counted machinery as a tool of capitalism. Machinery was to take the place of labor, he argued.

Facts did not follow *Erewhon* or Karl Marx but the fear of automation is still a hang-over from another age.

The petroleum industry, among the most advanced in automation—probably 20 years ahead of average U. S. industry, has shown a general increase in employment since World War II despite a rather rapid adaptation of automatic equipment.

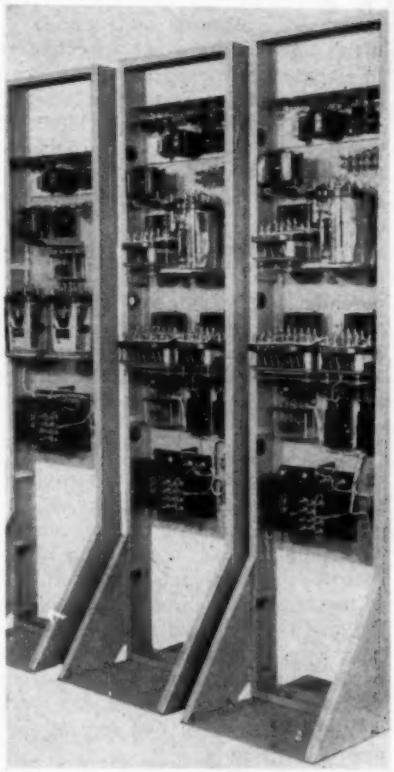
Oil Workers International Union (CIO) leaders have stated that oil industry employment is decreasing but they are confining themselves to what is known as "production" workers. U. S. Bureau of Labor Statistics give total petroleum refining employment as 189,300 in 1947 and 203,600 in 1954, an 8 per cent increase. Crude oil and natural gas production reported employment of 237,300 in 1947 and 294,300 in 1954, a 24 per cent gain.

It is true that employment has not risen in proportion to the rise in petroleum demand in the U. S. but rise in wages has followed rise in sales closely.

One incident in the history of mechanization points up the tight relationship between automatic machinery and high wages. More than 150 years ago Jacquard built an automatic loom that wove patterns by the punched card method. It was a big success and did much to put fancy "store" rugs into 19th century homes. The Jacquard loom fixers were the skilled workers of their time. Today the highest paid labor—or close to the top—in the textile mills are still Jacquard loom fixers, according to a U. S. Bureau of Labor publication.

Nat Weinberg, director of Research and Engineering for United Auto Workers-CIO said that automation

9. "How a Utility Company Can Profit from the Use of Electronics Data-Processing Equipment," Everett S. Calhoun, at Seminar on Electronic Data Processing, February 23, 1955.



Pipe lines have reached a high degree of automation. This pipe line surge detection and automatic shutdown equipment was built for the Texas Pipe Line Company by Union Switch and Signal.

"properly used, can advance by many years the realization in America of man's age-old dream of an economy of abundance. Improperly used . . . can create a social and economic nightmare in which men walk idle and hungry—made obsolete as producers, because the mechanical monsters around them cannot replace them as consumers."[10]

Weinberg's "nightmare" is strictly that. The *Erewhon* philosophy apparently is not dead. But he does not seem to see that automation has a built-in balance — more production needs more consumers; fewer consumers would automatically retard automation.

There is some evidence that shortage of labor has as much influence on automation as automation has on employment. Outside of military needs, household products account for three-fourths of the automation market. Part of these sales are directly traceable to the gradual decline of available household help. A large demand for automatic controls in homes comes from the housewife who does her own work now but had one or two servants before World War II.

There is substantial evidence that without postwar advances in machinery and automatic techniques, the U. S. could not fill its employment requirements in business and industry.

U. S. News and World Report[11] uses Bureau of Labor statistics to determine that some 59,300,000 workers would have been needed to achieve the actual production for 1954 if private industry had used 1947 methods. There were only 51,200,000 persons available for work in 1954 so there would have been a shortage of 8,100,000 workers, meaning actually that we would have produced 16 per cent less goods.

Government costs and taxes as well as every business operation — from banks and insurance to laundries and retail shops — would have been affected.

Automation and Education

One of the major results of automation is upgrading of employees. Automatic machinery and operation require more engineers, more technicians, more mechanics, more maintenance men.

Everett S. Calhoun, manager of Electronics Data-Processing Research, Stanford Research Institute, calls training of sufficient personnel to handle design, installation, programming and servicing "one of the most serious problems facing the manufacturers of electronic data-processing systems."[9]

10. "Labor on the Hook," Nat Weinberg, *Saturday Review of Literature*, January 22, 1955.
11. February 18, 1955, page 92.

AUTOMATION DICTIONARY

One company has published an Automation Dictionary with such words as *cascade control* and *hysteresis*. Minneapolis-Honeywell decided there was a need to explain the language of the new technology. Some are new words; others are old words with new meanings.

★ ★ ★

He said one manufacturer plans to spend $5,000,000 next year in a training program. One buyer he mentioned had to refuse delivery on a computer already ordered because a staff had not been organized and trained. All along the line, from the research on possible equipment to the maintenance problems after installation, personnel can be the chief bottleneck and apparently is.

More education and training are required to prepare workers for the new automatic operations than has ever been necessary before. This explains, in part, the growing interest companies are taking in sponsoring education among their employees and in supporting universities and colleges financially.

An offshoot of this effect of automation is that the increased years devoted to education become a limiting influence on labor availability. Men and women are compelled to spend more time in training for the more technical and higher paid jobs in today's business and industry. The future promises to put still more emphasis on education. There are now 2,500,000 college students. Drucker says 20 years from now we'll need 9,000,000 to 12,000,000 students in college to fill trained personnel requirements.

Another angle is that here and there a voice is being raised in favor of greater importance being given to classical education. One company has recently sent its executives back to school for a short time to study history and the arts. This may be touched off by the fact that automation is providing more leisure and an attempt is thus being made to prepare for it with better cultural tools.

Certainly we have no clear picture of the benefits of leisure at this time. Children, who have been freed from household duties, partly because of automatic equipment at home, have not shown a particularly bright record of leisure benefits. What is known as juvenile delinquency mounts as tasks at home diminish. We tend to look upon unburdened time as unqualified advantage but experience has not backed this up. How much leisure is a blessing to mankind has not been established. But it is a question that must be answered by individuals, by families and by companies.

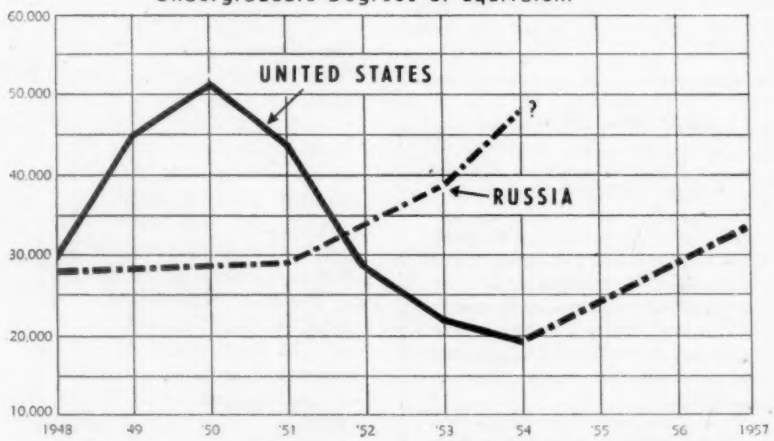
Management and Automation

While labor may have some temporary displacement by the installation of automatic machinery and equipment, it can look forward with good assurance to overall higher wages and shorter hours. Labor must learn new techniques but it doesn't have to work so hard or so long. Automation is attacking the most boring routine jobs which are valuable only as means to a pay check.

The case for management is not so bright. Management's hours have never been reduced as labor's have and responsibility has increased as companies grew larger and pressure of duties increased. But we think of management as lined up with machin-

ENGINEERING GRADUATES – UNITED STATES vs. RUSSIA

Undergraduate Degrees or Equivalent



Prepared by Manufacturing Chemists Association and reproduced from LION OIL NEWS for June.

Upgrading of employees are important results of automation and the need for more engineers and technically trained people. The above graph shows the decline in recent years of undergraduate engineers in the U. S. and the greater number given technical training in USSR.

ery and automation, and labor as *Erewhon* citizens, fighting its own tools. Actually management has never received the benefit from mechanization that labor has. (The consuming public has, of course, reaped the most benefit.)

Automation will be of more help to management problems than mechanization but it is not invariable good fortune. One reason is the scarcity of good management personnel. Upgrading reaches into top management and makes greater demands. Of course training for executives is becoming more commonplace and doubtless will further increase.

The new electronic computers can give management more information more quickly but it also increases the complexity of the problems and often adds new ones.

A business or process automatically operated must move smoothly and swiftly from raw materials to marketing. There is little time for management to make decisions and wrong answers are costly.

Another responsibility of management is handling employees when automatic equipment is installed and they must be re-trained, transferred, or retired. Management has a clear duty here to consider carefully the psychological effect on workers and the labor unions. Unions believe that automation reduces their power in collective bargaining and it is true that automatic plants could be run by management in case of a strike (like telephone companies do.) Without exceptional wisdom in dealing with the problems of changeover from manual to instrument controls, industry could find itself almost automatically taken over by an all-powerful state.

Management also has the difficult task of fitting automation to production; deciding on whether to apply the process by degrees or redesign the complete operation. Research today is so widespread and is pumping complicated new technologies and unstable new materials into industry and business so rapidly that the very problem of keeping automation in step with technology is a separate problem.

The problems of management have undoubtedly grown with automation but management has faced the challenge with good will and courage. To give better service and to make better products for less money is worth a lot of effort and that is what automation is geared to do.

Automation and the Nation

Uncle Sam had a lot to do with speeding up automation. Credit for servomechanism development lies in the efforts of the military in World War II. It was found to be outside human capabilities to direct guns from moving platforms to moving targets and from stationary platforms to moving targets. The problem was solved by automatic aim so that the projectile would hit the target despite movement.

War sped research. Cost was subordinate to results and results were forthcoming. Limited U. S. manpower was expanded by the tools of automatic war. Military might became more dependent on machines, less on human energy and control. Outcome of World War II could have been very different without the tools of automation.

Without automation how could atomic operations ever be carried out? When uranium is fissioned, radioactive materials are created and neutrons are released which are harmful to man. Automatic measurement, communications and controls are vital to development of nuclear energy. Only behind thick walls with instruments in control can nuclear fission be developed.

Without automation, there would be much more emphasis on manpower. The mass of human beings in Communist countries would have a heavier weight on the scales of world power. With automation a team of five to ten men can produce more than hundreds of workers can do with manual tools. With it the U. S. stands ahead of every nation in production.

Man's ability to command all the energy he needs and to control that energy without waste is the fullest measure of his progress. He has sought and found in this new method a more efficient means of use and control. Automation is a further test of our ability to provide a growing abundance for our people. ★ ★ ★

AUTOMATION . . . *in Gas Industry*

The term "automation" has come into popular usage in the past eight years and recently has been used to describe in the gas transmission and distribution industry any operation not manually controlled. But the practice of automation, in a liberal sense, is not new to the gas industry.

Certain types of elementary but workable semi-automatic control systems have been in use for as far back as 30 years. These have been primarily devices to shut down engines in event of overpressure and devices to operate valves from remote points. Subsequent refinements to this early instrumentation have made possible a form of automatic control through use of pressure-actuated devices to stop and start compressor units, open and close valves, and perform similar tasks.

In the intervening three decades, there has been an influx of instrument applications of all descriptions. These have contributed to remote controlled and telemetered compressor stations, metering stations, regulator stations, etc.

Many of today's large diameter, long distance transmission lines could not have been built or operated economically without this type of instrumentation. Advances in instrumentation techniques are being made almost daily, and the "modern" systems are already obsolete by today's standards.

Presently, a number of companies are planning to extend "remote" control to various operations. Included are completely unattended, remote controlled compressor stations, remotely operated city gates, and remotely operated regulator stations, with, in many cases, one central operating point.

Completely "automated" systems, however, are a long way off. They would require operation of an entire system directed by an electronic "brain"—most likely an analog computer—that could receive simultaneous information from all points, correlate it, and issue orders back. This would require huge amounts of electronic gear, not to mention capital outlay—so much that it may be economically unfeasible.

Automation can succeed only when it can do a job faster, better, and cheaper than human effort can do the same job.

The big advances in the utility phase of the natural gas industry will be in the use of more communications and greater instrumentation applications. Dispatching problems, system balance, maintaining load factor—these will be aided by increased use of telemetering equipment and supervisory controls. Greater use of computers in design, engineering, and in accounting will speed operations. Instrumentation and electronics are destined to be the gas industry's future "workhorses."

D. H. Hale, **Southwestern Editor.**

Performance Test for . . .

Gas-Fired Wall Heater

In Basementless House

● THE PURPOSE of an investigation by the National Bureau of Standards of the performance of a gas-fired wall heater in a basementless house was to determine the temperature distribution produced by typical gravity circulation of air or by using a small booster fan. Horizontal and vertical-temperature gradients were observed as a basis for judging the acceptability of this type of heating system for various climates and for houses of different sizes.

Observed heat loss of the test house was also compared with computed values to determine whether the capacity rating of a gravity, warm air furnace should be reduced by some fixed percentage when such a furnace was located on the living level of a one-story house.

The test data do not provide specific answers to all questions that might be raised about gravity warm air heating of basementless houses. They do provide, however, information on the temperature distribution produced by this type of heating system and offer some guidance in its application to small houses.

The results reveal that the heat loss of the structure was not significantly greater than for other similar heating methods where the heating unit is entirely enclosed in the heated space. It also was found that ceiling insulation is desirable to restrict heat loss upward and to promote radiation downward from the warm ceiling surface.

The test bungalow was constructed at the National Bureau of Standards for research in heat transfer phenomena. It has four rooms, a bath, and a small central hallway. Its floor area of 616 sq ft approaches the lower limit of acceptable area for detached single-family dwellings. The bungalow is enclosed within an insulated enclosure so the temperature outside the house can be maintained at any level that might be encountered throughout the United States.

In the gas-fired, warm air investigation, the heater was located near the center of the house. The distance from the supply grille to the most remote doorway of a connecting room was about 5 ft, and the distance to the center of the most remote room was about 11.5 ft. There was not more than one doorway between the heater and any room to be heated. The installation was favorable to good temperature distribution from the standpoint of floor area to be served, heater location, room arrangement, and distance from the heater to each of the connecting doorways.

The wall heater, with or without a booster fan, delivers a supply of warm air from one or more grilles whose center lines are typically 78 in. to 80 in. above the floor level. Since practically no duct system is used, the heater can deliver warm air directly into only 1, 2, or 3 rooms, depending on the heater location, and there may be one or more rooms that must be warmed by air movement in both directions through doorways.

In the rooms heated directly by supply grilles, heated air warms the ceiling by conduction and convection; the ceiling in turn radiates significant amounts of heat to the floor, walls and occupants of the house if the ceiling is adequately insulated.

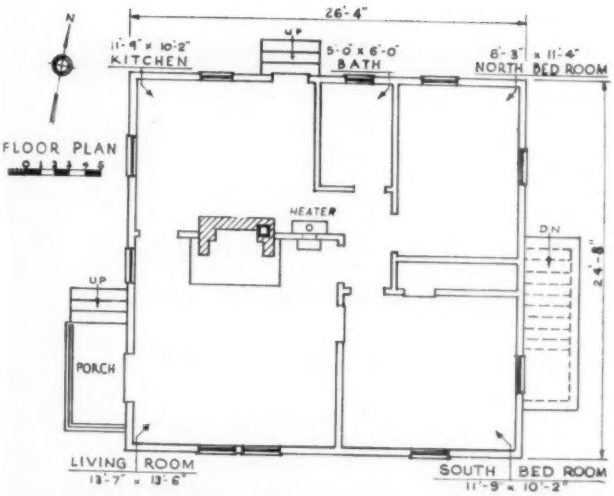
For example, in one test, the average ceiling surface temperature in the living room was 102 F. Previous studies of a ceiling panel heating system showed that the heat emission from the ceiling surface at that temperature was about 35 Btu per hour per square foot.

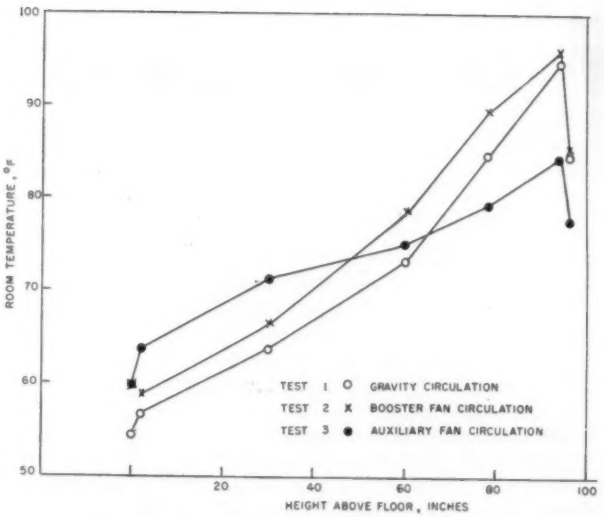
Since the warmest air is near the ceiling and since the heater delivers very little warm air below the level of the top of the doorways, the air that can pass to connecting rooms through doorways is at a lower temperature and, therefore, conveys less heat to these rooms. There is much less radiation from the ceiling of rooms heated through connecting doorways.

With gravity circulation of air through the heater, none of the warm air is delivered directly to the lower half of the room. Cooling of the room air at the exterior walls, however, causes downward convection currents. The temperature of the lower part of the room is determined by the temperature of these downward currents except when appreciable radiation occurs from the ceiling.

The air circulation rate through the heater by natural convection was 200-250 cfm, probably much less than the total natural downward convection at all exterior walls of the house. Consequently, the lower portions of the rooms could only be warmed as the downward currents of air as the exterior walls became warmer, except for radiation effects from the ceiling. Since the booster fan increased the air circulation through the heater no more than 20 to 30 per cent, it is probable that the booster fan forced little warm air

Interior view of test bungalow at National Bureau of Standards. Temperature distribution throughout the house was determined by means of thermocouples enclosed within the 3-in. cork spheres.




ROOM TEMPERATURE, °F
HEIGHT ABOVE FLOOR, INCHES
TEST 1 ○ GRAVITY CIRCULATION
TEST 2 X BOOSTER FAN CIRCULATION
TEST 3 ● AUXILIARY FAN CIRCULATION

At left. Floor plan of NBS test bungalow. Heating unit was installed centrally in the house for this investigation to evaluate the heater performance. The entire house is enclosed within an insulated shell so that the temperature outside the house can be maintained at any level found in the United States.

At right. Distribution of temperature with height from floor inside a room of NBS test bungalow.

into the lower part of the room.

The temperature distribution within the test bungalow was ascertained by means of 200 thermocouples enclosed in 3-in. cork spheres. These were at 5 stations and 5 levels in each of the 4 large rooms, at 3 stations and 5 levels in the bath, at suitable stations on the floor, in the ceiling surface, on the sidewalls, in the basement, in the attic, and outdoors. Additional thermocouples of the parallel multiple-junction type were placed at the heater inlets and outlets. The absolute values of the heat transmitted to the attic were determined with the aid of 20 heat flow meters placed over the first layer of rock wool insulation in the attic.

After steady state conditions had been maintained in outside and inside temperatures for approximately 8 hours, test periods of about 12 hours were begun. Inside temperatures at approximately 150 stations were recorded at 4-hour intervals. Hourly recordings were made of the following temperatures: Outside air, 30-in. level at 5 room centers, 5 positions in basement, 5 locations on furnace, gas supply temperature, and one location in the closet. Gas consumption, electrical energy used for lighting the house, electrical energy consumed by fan motors, and gas pressure were recorded hourly.

The test data do not provide specific answers to all questions that might be raised about gravity warm air heating of basementless houses. They do provide, however, information on the temperature distribution produced by this type of heating system and offer some guidance in its application to small houses.

The test results at an outdoor temperature of about —5 F show that the heater was able to produce a temperature of 70 F or higher at the 30-in. level in all rooms with either 2 or 3 supply grilles when the booster fan was in operation. With gravity circulation of the air under these conditions, it did not warm the 2 bedrooms and bath to 70 F at the 30-in. level. The temperature difference between the 2-in. and 60-in. levels was about 19 F with the booster fan in operation and 15.5 F with gravity circulation of the air.

Experience with this heating system and with other systems indicates that people begin to experience discomfort if the temperature, at the 2-in. level falls below 65 F or if the temperature at the 60-in. level exceeds 80 F. By this criterion, at an outdoor temperature of —5 F, some rooms would be too warm at the 60-in. level with the booster fan operating, and some would be too cold at the 2-in. level with gravity circulation.

Heating engineers commonly compute heat losses for dwellings on the basis of an indoor temperature of 70 F. It is generally recognized, however, that indoor temperatures to 75 F are preferred by some normally clothed adults. It is probable that at the 30-in. level, a 5 F variation of temperature between rooms would not be excessive as long as none of the temperatures was below 70 F or above 75 F and provided the *vertical* temperature differences in the living zone were not excessive. By this criterion, the temperature distribution attained in the test bungalow with the heater used for this investigation would hardly be acceptable at an outdoor temperature of —5 F but would be acceptable at an outdoor temperature of 15 F.

Some larger houses could have a lower heat loss than the test bungalow if more insulation were used to decrease the temperature difference between levels and between rooms. The computed heat loss of the test bungalow was about 51 Btu per hour per square foot of floor area for an indoor-outdoor temperature difference of 70 F.

The heat loss of the test bungalow was computed using the method of the American Society of Heating and Air Conditioning Engineers. On the average, the computed heat loss values were about 5 per cent higher than the observed values. In a particular installation of this type, the relation between computed and observed heat loss of a house would depend on whether the thermostat was set to produce a desired temperature in the warmest room or in the coldest room. For an indoor temperature of 70 F and an outdoor temperature of —5 F at the test installation, approximately 10 per cent more heat was required for the whole house when the coldest room was warmed to 70 F than when the warmest room was heated to 70 F.

It was concluded from the investigation of the specimen wall heater in the test bungalow that this type of heater, with or without a booster fan, should be used only in areas where the winter design temperature is 0 F or higher. Application in colder climates, however, might be satisfactory in some cases where the heat loss of the house is significantly lower than 50 Btu per hour per square foot of floor area at design outdoor temperatures. * * *

Gas Industry Construction Expanding

Sales of gas up 8 per cent in first-quarter while operating revenues jump 18 per cent

● THE GAS UTILITY AND PIPE LINE INDUSTRY spent $1,055,000,000 during 1954 on construction of new facilities, the American Gas Association reports. It is expected that in 1955 the industry's total construction expenditures will aggregate $1,385,000,000. This would make expenditures for new construction and plant expansion in the current year, the second highest in the history of the gas industry, surpassed only by the $1,462,000,000 spent in 1951 for construction.

Construction of distribution facilities is on the upturn, and about $441,000,000 will be spent this year to serve new housing and new gas house-heating demands.

Transmission expenditures in 1954 aggregated $394,000,000 and are estimated at $725,000,000 in 1955. Two major pipe line projects are expected in 1955. Pacific Northwest Pipeline Company is expected to construct a 2000-mile pipe line from New Mexico to major cities in Idaho, Oregon, and Washington. This line will cost an estimated $160,000,000. Second is the proposed 1200-mile, 30-in. American-Louisiana Pipe Line Company project. This line will extend from Louisiana to Detroit, Michigan. Cost of this project will be about $130,000,000.

Construction of these lines and other smaller projects brought natural gas pipe line mileage up to approximately 420,000 miles at the end of 1954.

During 1955-1958, the gas industry expects new construction costs will equal about $4,315,000,000, somewhat under the record $4,933,000,000 spent between 1951-1954. The forecast includes totals of $1,205,000,000 for construction in 1956, $974,000,000 for new facilities in 1957, and $751,000,000 in 1958. AGA bureau of statistics points out that these estimates are conservative since companies tend to underestimate construction expenditures, particularly for more remote years. Actual expenditures for 1957 and 1958 could be well above these estimates.

Ninety per cent of total construction expenditures for 1954 were devoted to natural gas facilities, while the corresponding percentage for 1955 is expected to be 93 per cent. For 1955-1958, it is estimated that 94 per cent of construction expenditures will go toward new natural gas construction.

Expenditures for construction for other types of gas totaled $109,000,000 in 1954 and will drop to about $101,000,000 this year. The four-year estimate for construction of manufactured and mixed gas facilities is about $282,000,000, compared with $396,000,000 spent on such construction work in 1951-1954.

During 1954, the industry used a total of 1,800,000 tons of steel with approximately 50 per cent of this total consisting of pipe 16 in. or larger in diameter. This amount of steel is about 15 per cent less than that used in 1953, when construction expenditures were significantly higher.

In the six years since 1949, the gas utilities and pipe line companies have used a total of 12,800,000 tons of steel.

Total operating revenues of the gas utility and pipe line industry reached a new high of $4,800,000,000 for the 12-month period ending March 31, 1955. This was a gain of 13 per cent over the $4.3-billion in the same period a year ago.

Net operating revenues in this 12-month period climbed to $637,000,000, an 18 per cent increase over the $540,000,000 a year earlier. Net income rose from $409,000,000 to $471,000,000, an increase of 15.2 per cent.

Total taxes paid by the gas utility and pipe line industry during the 12 months rose to $602,000,000 from $541,000,000 during the same period a year ago. Total taxes, including federal income taxes, represented 12.4 per cent of operating revenues for the gas industry in the 12 months.

Total revenues of gas utilities from sales of gas to ultimate consumers, excluding sales to other utilities for resale, were $1.2 billion in the first quarter of 1955. This was a gain of 13.4 per cent over revenues of one billion in the same quarter last year.

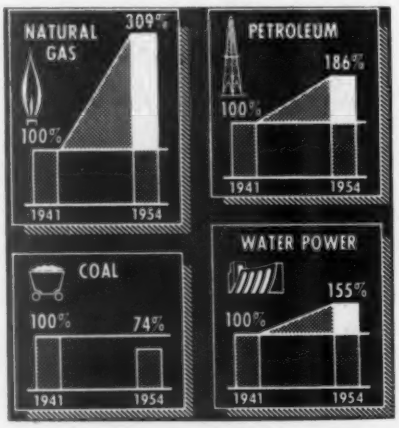
Sales of gas during the first quarter of 1955 amounted to 20.8 billion therms, a gain of 8.4 per cent over the 19.2 billion therms sold in the 1954 quarter. Gas utility and pipe line sales to ultimate consumers totaled 62.6 billion therms in the same 12-month period. This was an increase of 7.8 per cent over the 58.1 billion therms sold in the period a year earlier.

On March 31, 1955, a total of 28,000,000 customers, excluding approximately 250,000 customers receiving liquefied petroleum gas through utility mains, were receiving utility gas. This was a 3.4 per cent increase over the 27,100,000 customers served a year earlier. Of this total, 25,800,000 were residential customers, a gain of 3.3 per cent or 829,000 more residential customers than a year ago.

Revenues from sales of natural gas to ultimate consumers amounted to one billion during the first quarter of 1955 —a gain of 15.1 per cent over the $888,000,000 a year ago.

In the first quarter of 1955, sales of natural gas increased 8.5 per cent to

U. S. Energy Sources Based on Energy Produced 1941 = 100%



Natural gas contributed 25 per cent of the nation's total energy supply last year, this American Gas Association comparison shows.

19.6 billion therms from the 18.0 billion therms sold during the 1954 quarter. For the 12 months ending March 31, natural gas sales totaled 59.2 billion therms, a 7.9 per cent increase over the 54.9 billion therms sold in the same period a year ago.

The 22,500,000 natural gas customers on March 31, represented 80.3 per cent of the total gas industry customers. A year ago there were 21,100,000 natural gas customers, representing 77.9 per cent of the total gas industry customers.

Sales of manufactured and mixed gas increased 6.7 per cent during the first quarter of 1955, and revenues from the sales were up 3.1 per cent. ★

Gas Utility and Pipe Line Construction Expenditures

(Millions of Dollars)

Type of gas plant function	Actual 1954	Forecast 1955	1956	1957	1958	Total forecast 1955–1958	Actual total 1951–1954
Natural gas—total	$ 946	$1284	$1133	$920	$696	$4033	$4537
Production and other storage	110	73	72	73	74	292	542
Transmission	389	720	577	402	183	1882	2422
Underground storage	42	74	47	32	34	187	171
Distribution	346	371	387	380	373	1511	1218
General	50	46	50	33	32	161	184
Other gas—total	109	101	72	54	55	282	396
Production and storage	20	19	13	11	13	56	76
Transmission	5	5	2	1	1	9	21
Distribution	77	70	51	39	37	197	274
General	7	7	6	3	4	20	25
Industry—total	1055	1385	1205	974	751	4315	4933
Production and other storage	139	92	85	84	87	348	618
Transmission	394	725	579	403	184	1891	2443
Underground storage	42	74	47	32	34	187	171
Distribution	423	441	438	419	410	1708	1492
General	57	53	56	36	36	181	209

Current GAS PRODUCTION Topic

Tar quality as effected by processing

● GENERALLY, use of optimum cracking conditions results in good set operation also in production of tar of best sale quality. Tar will vary depending upon type of oil and set used.

When oil is overcracked, tar produced has high insoluble content and high viscosity, which cause difficulties in handling, dehydrating, storage and processing. Products made from this type of tar generally are of poorer quality for most uses, than those from tar produced under optimum cracking conditions. Undercracking oil results in tar with high sulfonation index, poor weatherability and other undesirable properties.

When good-quality tar is produced, care must be exercised to prevent degradation in handling and dehydrating. Temperature of tar should be kept low as possible, consistent with handling-and-processing requirements to minimize increase in viscosity due to loss of volatile fractions and polymerization. Long periods at moderately high temperatures will cause as great increase in viscosity as shorter periods at high temperatures, so prolonged tar storage in heated tanks should be avoided.

To produce tar with low salt content, it is essential to add fresh water to system in sufficient quantity to prevent salt built-up. Water phase of tar emulsion should be separated as completely as possible by settling or centrifuging; any salts present in water removed by distillation will be left in tar.

In dehydrating tar by distillation, best quality will be obtained from a process which maintains tar at elevated temperature for short period only. Continuous dehydration using flash distillation appears to be most suitable for this purpose. Oils flashed off with water can be recovered and processed to produce additional light oil with still bottoms returned to dehydrated tar to reduce viscosity. Since oils removed with water contain appreciable amounts of low boiling fractions, return to the tar without stripping out light oil will result in lowering flash point below that of tars usually handled by distillers. This might restrict salability.

These are specifications of better grades of oil gas tar now being produced:

Sp. Gr., 15/15C ..... 1.190, min.
Water, per cent by volume ... 2.0, max.
Float test @ 32C, secs. 30-200
Free carbon, CS_2 insoluble, per cent by weight 10-18
D-20 distillation, per cent by weight to:
170C ..... 1.0, Max.
235C 6.0-10
270C 12-18
300C 19-25
335C 33-40
Softening Point, residue to 300C, R&B 65-80C
Softening point, residue to 355C, R&B 105-140C
Sulfonation index, ml/100 grams tar, fraction 0-300C ..... 0.10, max.
Sulfonation index, ml/100 grams tar, fraction 300-355C ... 0.10, max.

This is a condensation of a presentation by C. U. Pittman, technical dept., tar products div., Koppers Company, Inc., at American Gas Association's 1955 chemical, engineering and manufactured gas production conference. For details, communicate with AGA Operating Section.

Utility Financial Report

	1955	1954
Alabama Gas Corp. 12 mos. to June 30		
Operating revenue	$23,552,692	$21,669,612
Net income	1,859,607	1,743,529
Per share	1.90	1.95
Arkansas Western Gas Co. 6 mos. to June 30		
Net income	462,729	427,365
Per share	1.07	0.98
Baltimore Gas & Elec. Co. 12 mos. to June 30		
Operating revenue	113,078,000	101,770,000
Net income	13,579,000	10,302,000
Per share	2.15	1.69
Brooklyn Union Gas Co. 6 mos. to June 30		
Operating revenue	28,683,742	27,572,390
Net income	3,056,553	2,868,231
Per share	1.64	1.54
Central Hudson Gas & Elec. Co. 12 mos. to June 30		
Operating revenue	24,472,978	22,398,855
Net income	3,346,120	2,817,175
Per share	1.02	0.972
Consumers Power Co. 12 mos. to June 30		
Operating revenue	178,503,119	165,094,468
Net income	27,657,076	25,963,513
Per share	3.25	3.02
Delaware Power & Light Co. 6 mos. to June 30		
Net income	2,485,501	2,338,788
Per share	1.12	1.05
Long Island Lighting Co. 12 mos. to June 30		
Net income	9,718,551	8,621,132
Avg. com. shares (no.)	6,241,703	5,340,259
Per share	1.28	1.31
Missouri Public Service Co. 6 mos. to June 30		
Net income	731,830	866,488
Per share	0.39	0.50
Montana Power Co. 12 mos. to June 30		
Net income	8,043,930	7,514,238
Per share	2.75	2.63
Mystic Valley Gas Co. 6 mos. to June 30		
Net income	369,550	326,054
Northern Illinois Gas Co. 12 mos. to May 31		
Operating revenue	66,634,599	57,108,561
Net oper. inc. before Federal taxes	17,554,202	13,336,284
Per share	1.18	—
Portland Gas & Coke Co. 12 mos. to June 30		
Operating revenue	12,466,362	11,291,974
Net income	1,170,432	884,299
Per share	2.14	1.61
Southern Indiana Gas & Elec. Co. 12 mos. to June 30		
Net income	2,583,816	2,270,244
Per share	2.38	2.03
United Gas Improvement Co. 12 mos. to June 30		
Net income	2,712,626	2,930,250
Per share	2.09	2.20
Shares outstanding	1,242,627	1,267,079

How High-Temperature Jets Are Utilized in Some Industries

● INDUSTRIAL heat processing applications utilizing techniques described in Parts 1 and 2 of Henwood's presentation before ASME often require that final temperature of the object be controlled by a predetermined exposure time to continuously reproducible heat transfer conditions. This is successfully practiced by industry, and exposure-time tolerances of less than 1/10 sec are not uncommon. This means heat release with respect to time must be under accurate control.

Numerous devices, designed to eliminate these factors as uncontrolled variables, are well developed, and practically any magnitude of heat-processing load can readily be accommodated by instruments and machines for:

1. Supplying constant-ratio air-gas premixtures under pressure to 15 psig;
2. Supplying constant air and gas piped separately to burners, 500 psig.

Proper selection of air/gas proportioning equipment is determined by mode and rate of heat transfer required by process, mechanical energy required in jet, and by economic considerations. Equipment is readily available for supplying burners with air and fuel gas at constant ratio, over wide ranges of pressure and flow rates, and within tolerances dependent upon requirement and economics.

An examination of several typical applications and installations embodying this principle will further clarify the objectives to be achieved.

Continuous forming of viscous materials. Figure 7 illustrates application of a high-velocity jet to continuously heat, form, and deliver new products processing valuable physical characteristics.

In this instance, fuel gas performs precision operations, in proper sequence and with micro-timing. Variables involved suggest the complexity of the process but, also, many possible combinations of variables to produce new products:

1. Temperature of jet;
2. Velocity of jet;
3. Viscosity of jet;
4. Temperature—viscosity relation of raw material;
5. Density of raw material;
6. Diameter of raw material entering jet;
7. Heat transferred to material in unit time;
8. Rate of raw material fed to jet;
9. Relation between viscous drag of jet upon material and its change in dimension and temperature-viscosity with respect to time.

Atomization of molten materials. Figure 8 illustrates application of high-temperature high-velocity jet for subdividing molten materials by atomization. It is physically simpler to shear a liquid than a solid; many materials of relatively low viscosity in the molten state may be atomized to produce finely-divided solids.

Surface hardening automotive cams. An automatic machine was designed specifically to surface-harden cams of alloy gray-iron automotive camshafts. Fuel-gas and air combine in jet-type burners in a reproducible hardenability pattern on each cam surface of the shaft, simultaneously. The shafts are automatically quenched in oil to produce a hardness of Rockwell C-50.

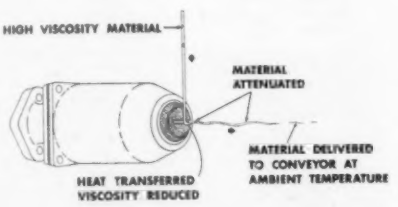

HIGH VISCOSITY MATERIAL
MATERIAL ATTENUATED
MATERIAL DELIVERED TO CONVEYOR AT AMBIENT TEMPERATURE
HEAT TRANSFERRED VISCOSITY REDUCED

FIG. 7. Continuous heating, forming, and conveying of micro-fine filaments from viscous materials.

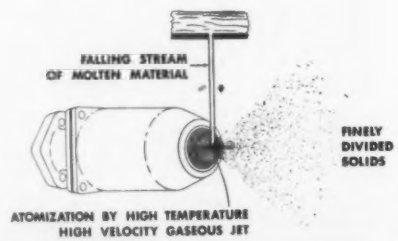


FIG. 8. Atomization of molten materials.

With variable heat balance existing from cam-to-cam, due to different heat conduction and radiation conditions pertaining to each cam, variable heat transfer rates must be provided, nozzle-to-nozzle, by quadruple-nozzle jet burners. This condition is satisfied by designing the area of individual nozzles to accommodate the relative heat transfer rate required by each cam.

The camshafts are charged at the top of the unit where moderate preheat is secured. They are then automatically positioned and rotated — while heat is being transferred to face of each cam—at rate to permit surface hardening. The production rate is 120 camshafts per hr; heat input is 1,500,000 Btu per hr.

Pattern hardening of rail ends. Proper hardening of rail ends to desired mechanical properties has greatly increased the service life of rails. It appears to be only a matter of time before all rail producers adopt the method. Pioneering installation was made by Bethlehem Steel Co.

Both ends of rail are treated simultaneously by indexing beneath burners in this sequence:

1. Rail head is heated uniformly to approximately 1000 F beneath 3 unit-type radiant burners for total time of about 4½ min (90 sec index);
2. A fourth index places rail beneath a jet burner, when burner nozzle is automatically positioned over rail end. Approximately 90 sec later, desired hardenable temperature pattern appears;
3. The fifth index accurately positions rail head beneath high-

pressure air, 95-100 psi, quench nozzle for about 30 sec;

4. Following completion of air quench, sufficient heat remains in adjacent section of rail head to temper the fine, pearlitic, hardened structure, producing final average Brinell hardness well within the range of 331-401 recommended by American Railway Engineering Association.

At a heat input of 2,500,000 Btu per hr hardening bay, production rate of over 30 rail per hr, limited only by treatment time and production-line finishing methods, has been attained at one plant.

Production in excess of 500,000 tons of hardened rails by the Bethlehem plant indicates a completely satisfactory product. Precise time-temperature rates, both heating and cooling, permitted development of a new process.

Submerged heating of liquids. Direct heating of liquids is accomplished by specially designed jet burners. Combustion of compressed air-gas mixture is completed in refractory-lined combustion chamber under pressure approximately equal to the submerged hydrostatic head. Gaseous jets of combustion products near 3000 F, issue from the diffuser, creating excellent agitation of the solution, and efficient heat transfer-gases-to-liquid.

In Philadelphia's modern sewage-treatment works, a multiple-group of burners are used to maintain around-the-year temperature of sludge at maximum digestion rate.

One product of sewage digestion is a gas of high methane percentage, a by-product of the basic bacteriological process. The gas is collected and piped to air-gas pre-mixture machines from which it is discharged, at 3 psig in stoichiometric proportions, to the burner combustion chambers. Overall thermal efficiency of 85 per cent is regularly achieved.

Continuous singeing of textiles. Corduroy is singed at 100 yd per min while passing under 2-million Btu per hr burners. If travel of the cloth web is stopped, cloth automatically retracts from the burner and a baffle moves between burner and cloth.

Fire polishing of glass. Electric meter cases, glass, are uniformly internally-polished immediately after forming. Advantage is taken of shape of the object; relatively low-velocity jet-type burners achieve beneficial high-temperature gas flow. Result is uniform heat-transfer over entire internal area. Fire polishing time is 10 sec; heat input is 180,000 Btu per hr.

Continuous strip heating. 100 hr while the latter requires approximately 90 sec at 1,000 ft per min.

One of the more important considerations resulting from a new process are the characteristics of the product. Highspeed, approximately 90 sec heating time at 1000 fpm, continuously annealed steel strip has been designated by tinplate consumers as TU temper (universal temper) because of the different physical characteristics, compared to batch annealed stock, with its healing-soaking-cooling cycle of about 100 hr.

These properties are summarized:

1. Uniform physical properties, edge-to-edge of strip;
2. High degree of corrosion-resistance due to elimination of anneal border, which occurs in batch-annealed strip;
3. TU temper permits high degree of drawability in production of medium and deep-draw products. Tendency of batch-annealing product to flow irregularly around die is eliminated.

Continuous heating of steel rounds. Heating of round billets for seamless tubing is a critical operation. Among other requirements, billet must be at uniform temperature if uniformity of wall thickness is to be achieved in final product.

Conventional practices in steel industry apply roll-down and rotary-hearth furnaces requiring 20 15-min per inch of diameter to heat to piercing temperature, 2200-2250 F. Contract between billet and hearth adversely affects temperature uniformity.

High-speed heating, utilizing relatively small radiant enclosures completely surrounding the billets, is arranged to provide tonnage required when heating at a rate of 4 min per inch diameter. Billets approximately 30 in. long and 4-5 in. in diameter are charged and conveyed automatically through heating zones and are automatically cut at 2200-2250 F by a hot saw and delivered to piercer.

Principal advantages gained by this heating method are: 1. Constant supply of uniformly heated rounds to rotary piercing mill; necessary starting point in production of concentrically uniform seamless tubing; 2. Reduction in scale per heated ton owing to reduction in heating time; 3. Reduction of power required to displace the metal at piercer owing to improved plasticity of uniformly heated round; 4. Reduction in operating personnel owing to adaptability of design to automation.

Tubular products are similarly heated on an individual, continuous, high-temperature-gradient basis to reheat for sizing, hardening, tempering, annealing and normalizing.

Fluid processing in petrochemical industry. A tubular heater that has greatly extended on-stream operating time in refinery operations, incorporates radiant burners that are distributed and zoned in opposing side walls so that the tubes are exposed to direct radiation from both sides and to low-velocity uniform-temperature combustion products.

Complex time-temperature curves are readily obtained in the radiant section of the heater. Localized overheating is eliminated, permitting heater duty to be increased to maximum permissible for alloy tubes or for liquid under process.

Results obtained during 3 years of operating experience show conclusively higher yields of higher quality product without introduction of costly operating problems.

Direct-fired dryers in printing industry. Application of 2 retractable-web radiant dryers to a single web, 4-color perfecting web press, with radiant temperature of 1800 F, has made possible web speeds of 1200-1600 fpm as common practice.

Control of web speed, temperature head, and temperature uniformity in micro-amounts permits setting the ink without discoloring paper or impairing fidelity of colors.

Conclusions

New process, new products and improved existing processes will result from more tightly-coupled knowledge among the fields of process development, combustion, heat transfer and fluid mechanics. Relatively little information is available on the subject of high-temperature aerodynamics but it is as fundamental to heat processing technology as the combustion reaction itself.

It is hoped that, by citing actual applications of these principles, perhaps the imagination of industry will be stimulated toward further progess in heat processing.

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THIS CONCLUDES Henwood's presentation of gas jets as applied to industrial heat processing. He delivered the original discussion as part of the international conference on combustion, in Boston, in mid-June, sponsored by The American Society of Mechanical Engineers and The Institution of Mechanical Engineers. * * *

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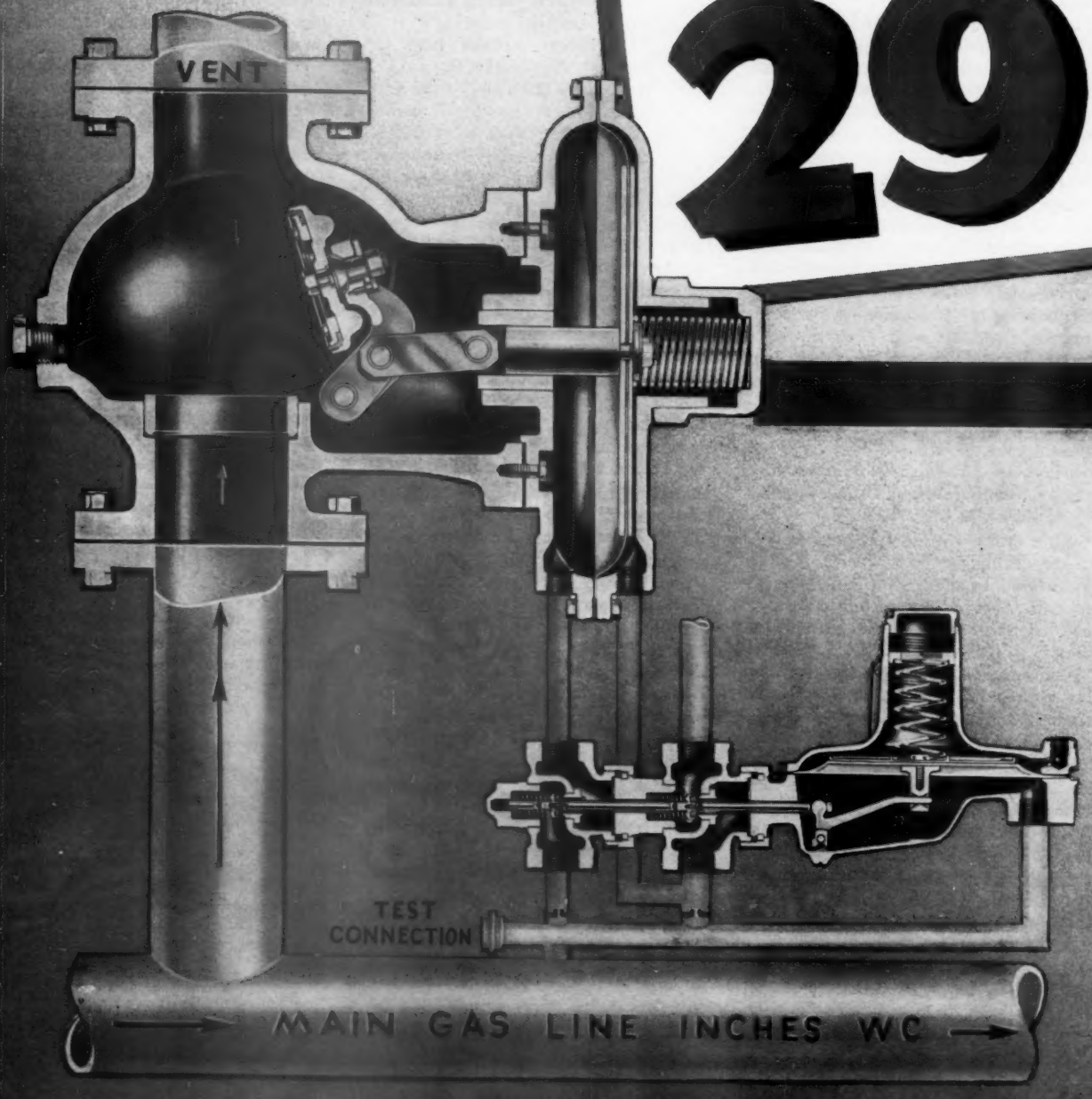

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● Since the end of World War II, there has been considerable improvement in industrial heat treating furnaces. Industry's demands, coupled with ever-increasing knowledge and experience of industrial furnace manufacturers, have brought about this trend. At times it has been difficult to determine whether demand or improved furnace equipment was the greatest contributor to this marked advance. However, the end result, improved equipment for better production, is also very advantageous to the gas industry.

Heat treating costs, which were relatively high, became one of the first targets of cost reduction programs. Fuel saving by increased operating efficiency or reduction of actual fuel cost could not bring about results required. What could be saved in this manner was insufficient, so this source became of secondary concern. In many cases fuel costs were increased to realize greater savings in other ways.

One of the most common ways of reducing heat treating production costs is by speeding up process. Shortening time required to heat treat a part means less parts in production, reduced inventory of raw material, lower operating cash requirements and less contingent interest charges per piece produced.

A great source of expense in high temperature heat treating operations is scale formation and subsequent removal. The actual percentage of metal lost and cost of subsequent acid pickling, sand blasting or peening represents a large portion of operating costs.

The decarburization of steel during heat treatment, for many parts, is also a source of production expense. To remove decarburized surfaces requires considerable additional machine work, which is very costly.

For many years skilled labor has become increasingly difficult to obtain and cost of it has steadily mounted. Industry's only way of coping with this problem has been to reduce amount of labor required; the foreseeable future offers no better solution.

To successfully meet these production problems has dictated the trend followed by industrial furnace equipment during the past few years.

It has long been known that forced convection by circulating fans in furnaces will increase the rate of heating. However, in direct-fired furnaces, at temperatures where scale forms, forced circulation of hot gases within the furnace also moves fine scale particles around very rapidly. These are abrasive and rapidly wear away refractory parts of furnace. The extended use of prepared atmosphere furnaces, in which no scale forms, has eliminated this disadvantage of a circulating fan.

The introduction of high capacity recirculating fans to prepared atmosphere furnaces has increased heating capacity from 25-30 to as high as 75-100 lb of steel per square foot of hearth area per hour.

Another interesting development, which has made possible large capacity, gas fired, atmosphere furnaces for higher temperature ranges is the improvement in heat resistant alloy steels. There has recently been made available an alloy steel which increases maximum operating temperature of gas fired prepared atmosphere furnaces with alloy muffles or radiant tubes from 1850 to 2050 F. Gas has been introduced as furnace fuel into stainless steel, copper brazing, powder metallurgy and similar high temperature treatments, formerly limited to heating by electricity except for low production batch operations.

Prior to World War II the greatest step forward in heat treatment of metals was the introduction of prepared atmospheres. Constant research, extensive use and actual operating experience has materially improved the manner in which gases are utilized for prepared atmospheres. This has resulted in more accurate and constant control of surface condition of the heat treated parts as well as introduction of some new processes, such as carbon restoration and homogeneous carburizing.

With earlier types of prepared atmosphere furnaces it was necessary to bring parts being heat treated through air during transfer from heating chamber to quench. During transfer, because metal was at elevated temperatures and had very clean surfaces, it was easily and instantaneously scaled by oxygen in the air.

Modern designs of prepared atmosphere furnaces provide a gas-tight enclosure between furnace and quench tank. This vestibule is kept purged with the same atmosphere used in the furnace and metal parts are not exposed to air until after quenching when they are sufficiently cooled to be unaffected by air.

To provide mechanical means of conveying parts into, through, and away from heat treating furnaces and quench tanks has always been a major problem to furnace manufacturers. The requirements vary considerably and depend to a great extent upon the shape, form, weight and quantity of parts to be handled.

The types of mechanical handling equipment used in other parts of a plant usually cannot be applied to heat treat furnaces because of the high temperature at which they must operate and allowances that must be made for expansion and contraction between hot and cold conditions that are encountered. Also in many heat treatments, parts must be racked on fixtures to keep them properly separated rather than be random-loaded into containers.

In spite of these difficulties furnace manufacturers have made great strides in development of conveyor systems. This has brought about a material reduction in labor needed to operate heat treating furnaces.

In addition, automatic controls have been applied to conveyor systems which will, without manual attention, expose each part to various temperature cycles required for the proper period of time.

Most stainless steels must be heat treated at temperatures of 1900 F and higher. Stainless steels are very difficult to clean by pickling. For bright heat treating of stainless steels, an atmosphere free of any oxygen even in combined form with other elements, is necessary. These conditions offer pro-

ducers of gas fired heat treating furnaces a challenging design problem.

A furnace that has successfully met these rigid specifications is of the muffle type, indirectly heated, with direct connected water jacketed cooling chamber and charge and discharge vestibules.

The furnace muffle is of inconel and has a circular cross section to minimize internal stresses, which shorten alloy life. The furnace casing is also circular, with gas burners directed to fire tangential to the inner surface of refractory lining, over and under the muffle, providing rapid and uniform heating.

Vestibules are located at both ends of the furnace and are equipped with gas-tight inlet and outlet doors. This design of vestibule serves as an atmosphere lock and purge chamber to prevent air infiltration that will contaminate the prepared atmosphere in furnace or cooling chambers.

In recent years, standard large oven furnaces have been equipped with roller rails on the hearth and combination pusher-and-puller mechanisms for ease in handling furnace charges placed on trays outside the heating chamber. The trays are hooked together with inverted, U-shaped links and entire furnace charge is handled at one time.

The pusher mechanism is equipped with a dog that pushes against the outer-most trays when charging the furnace. It also has a hook which can be attached to the trays nearest furnace door for extracting charge. Operation of pusher mechanism is reversed when it is used for pulling.

Large oven furnaces equipped with pusher mechanisms and roller rails have been used extensively as continuous furnaces by installing a door at each end. The pusher at charge end pushes one tray against another and conveys entire charge through the furnace. Trays can be removed from furnace manually or a pull-out mechanism can be installed at discharge end.

In some cases where the parts to be heat treated are sufficiently large and have proper end surfaces for bearing one against the others the trays can be dispensed with. For discharging such parts the furnace rails can be sloped downward at the discharge end and removal attained by gravity.

Continuous furnaces of this type can be constructed completely in the furnace manufacturer's plant to save additional cost field erection at the site. Originally, limitation in length to which a furnace of this type could be shop-produced was 24 ft. Recently, furnaces of this design have been built in 2 sections and bolted together when installed. The pusher-and-puller mechanisms are shipped as separate units and attached to the furnace structure when installed.

The width to which a furnce of this design can be shop constructed is controlled by the greatest width a freight car can handle.

The modern prepared atmosphere furnace costs considerable to design. Because it must be gas-tight construction, production costs are higher. Conveyor equipment, as well as automatic controls, also increase costs. These all contribute to making the original investment required for modern furnace equipment rather high as compared to what industry has been accustomed to.

The big question becomes: How far should a purchaser go in investing in modern heat treating equipment? There is no general answer to that question, because individual conditions and extent of savings in operating costs that can be realized are controlling factors.

Usually reduced operating costs of the furnace itself cannot come near justifying original investment for a long period of time. However, elimination of processes subsequent to heat treatment, abolishing costly rejects and saving of labor usually reduce production costs sufficiently to amortize required investment within a short period of time.

Today, the sales technique for industrial heat treating equipment has become the presentation of new production processes rather than of just a heat treating furnace. To get the order the purchaser must be convinced that overall production costs will be ment safe, sound and profitable. ★ ★

Gas Company Cleared in Explosion Due to Faulty Customer-Piping

"If a property owner orders a gas company to turn on gas, is the company liable for subsequent explosions caused by defects in the property owner's pipes?"

According to a late high court decision, the answer is no.

In Scarborough v. Central Arizona Company, 117 Pac.)2d) 487, the higher court established important law as follows: If a gas company employee turns gas into a meter when he has actual knowledge, or reasonable ground to believe, that the house fixtures are defective, the employee is negligent and the gas company is liable for resultant damages. If the employee of the gas company knows that the gas meter or connecting pipes leak and gas escapes into premises, the company is liable for damages for resultant damages, if the employee turns on the gas. But if the property owner orders a gas company to turn on gas, the gas company is not responsible for unknown defects in the property owner's lines.

In the above higher court case, the testimony proved that a gas company employee turned on gas at a meter outside a dwelling without examining the condition of the pipes inside the house. Some of these pipes were uncapped which permitted gas to enter the house. The occupants of the house suffered severe injuries, resulting from an explosion, for which they sued the gas company for damages.

It is interesting to know that this higher court refused to hold the gas company liable and explained that it is a duty of a property owner to inspect his own pipes and fixtures before ordering the gas officials to turn on gas.—L.T.P.

Editor's Note: Despite this ruling in favor of a gas company, Gas Journal would not favor any regard of the ruling as a legal anchor which would tend to ease safety precautions by gas companies under circumstances such as those in the case the author has just described.

Materials Handling

This special fork-lift extension arm, for 4000-lb lift trucks, was designed, developed and constructed by Southern Counties Gas Company, for handling drums, large valves and similarly heavy and bulky pieces. In a report to the purchasing and stores committee, American Gas Association, Paul T. Hughes, supervisor of stores, Southern Counties, said, "This attachment has paid for itself many times over because of the more rapid rate of car unloading and drum stacking."

The fork-lift extension arm is constructed from standard shapes and is designed for 1500-lb loads, with 3000-lb full-swivel hook and grabs.

Gas Industry STATISTICS

Price Indexes: Gas, Other Fuels and Electricity

(1947-1949 = 100.0) Source: Bureau of Labor Statistics, U. S. Department of Labor

	1955					1954								1953
	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	Jan.	Jan.
GAS														
Space heating	121.5	119.5	119.6	119.2	117.3	116.4	115.7	115.5	114.6	114.5	114.4	114.3	113.6	108.9
Non-space heating	112.7	112.2	112.2	111.3	111.1	110.6	109.8	109.7	108.8	108.8	108.9	108.8	108.8	106.4
Natural														
10 therms	102.1	101.7	101.5	101.4	101.0	100.9	100.6	100.5	99.4	99.5	99.9	99.7	100.0	98.3
25 therms	117.1	116.2	116.3	116.1	115.8	114.8	113.9	113.7	112.3	112.2	112.5	112.3	112.2	108.9
Manufactured														
10 therms	111.7	111.5	111.5	111.2	111.2	111.1	109.5	109.5	109.5	109.4	109.2	109.4	109.4	106.9
25 therms	111.1	110.8	110.8	110.6	110.6	110.5	110.3	110.3	110.2	109.4	109.6	109.6	109.6	107.8
Mixed														
10 therms	105.2	105.2	105.2	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.2
25 therms	102.2	102.2	102.2	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.0
All types combined														
10 therms	108.7	108.5	108.3	106.6	106.4	106.3	105.6	105.6	1 5.0	105.1	105.2	105.2	105.3	103.6
25 therms	116.8	116.1	116.1	115.8	115.5	114.7	113.9	113.8	112.7	112.6	112.7	112.6	112.5	109.5
ELECTRICITY														
Composite	106.2	105.8	105.8	105.8	105.5	105.5	105.2	104.9	104.8	104.8	104.8	104.5	103.8	104.4
SOLID FUELS														
Bituminous—All sizes combined	117.8	119.6	120.4	120.4	120.4	120.2	119.9	119.4	118.7	117.9	117.4	117.2	120.7	119.8
Anthracite—All sizes combined	120.3	129.6	131.2	131.2	130.9	129.2	128.5	126.5	126.4	124.7	124.1	124.1	135.0	135.9
PETROLEUM														
Fuel oil No. 2	122.9	125.1	125.0	125.0	125.0	124.2	121.0	121.0	118.8	118.5	117.7	117.7	121.9	116.6

Sales Indexes: Gas and Electricity

To ultimate consumers

Seasonally adjusted (1947-1949 = 100.0) Sources: American Gas Association and Edison Electric Institute

	1955							1954							
	June	May	April	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	April
Gas	191.5	188.2	195.5	212.5	216.9	206.0	198.3	195.7	190.0	171.7	178.8	180.6	180.2	176.2	174.9
Electricity	194.6	192.5	190.2	187.1	184.0	180.1	178.7	175.9	175.9	173.1	175.6	177.7	174.6	168.6	164.8

Shipments: Residential Appliances

(000 units) Source: Gas Appliance Manufacturers Association

	1955					1954									
	June	May	April	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Jan.
Ranges															
Gas	182.0*	175.1*	182.3	217.3	186.2	152.9	145.7	174.0	197.1	203.9	179.4	134.5	174.3	163.8	137.0
Electric	—	124.9	124.1	148.8	145.4	156.2	97.2	90.7	96.4	113.8	86.8	91.4	98.1	94.5	116.4
Water heaters															
Gas	216.5*	229.4	245.2	263.1	214.7	200.0	166.8	179.1	202.0	205.5	207.1	190.3	206.7	195.6	164.4
Electric	—	83.5	76.9	84.9	75.4	62.4	49.4	57.1	63.7	80.4	66.6	73.0	69.8	69.8	53.9
Furances, gas	76.2*	66.9*	58.0	53.7	47.7	50.3	64.3	79.0	82.0	75.4	53.1	57.3	57.3	49.9	31.0
Boilers, gas	7.5*	5.6	4.9	5.0	3.7	Note †	7.0	10.8	10.9	8.9	6.0	6.2	6.2	6.0	2.9
Conversion burners	16.1*	12.3	9.5	7.4	6.4	5.2	9.2	16.0	32.2	35.9	29.4	19.9	19.7	22.5	8.8

* Preliminary totals. † GAMA is reevaluating all 1954 data on boilers.

Index of Yields: Selected Utilities Stocks

Expressed as percentages

	1955				1954										1953
	July	June	May	April	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	Jan.	Jan.
Transmission companies	4.04	4.24	4.13	4.04	3.94	4.01	4.25	4.27	4.40	4.40	4.17	4.17	4.25	4.21	4.04
Transm. and distrib. companies	4.80	4.83	4.78	4.80	4.91	4.87	5.00	5.08	4.69	4.70	4.61	4.67	4.88	5.39	5.02
Manuf'd mixed companies	4.71	4.71	4.79	4.71	4.72	4.48	4.57	4.88	4.72	4.38	4.16	4.26	4.36	4.66	4.87
Class "A" electric companies	4.21	4.38	4.34	4.25	4.36	4.07	4.13	4.20	4.37	4.46	4.36	4.31	4.31	4.92	5.08
Class "B" electric companies	4.43	4.62	4.63	4.57	4.60	4.55	4.68	4.72	4.69	4.77	4.74	4.70	4.78	5.14	5.19

This is a straight arithmetical index of comparative yields obtainable on selected gas and electric utility common stocks. The companies comprising this index were selected by AMERICAN GAS JOURNAL as providing a cross-section of each industry. No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because yields afforded on issues reflect such changes. The index is designed to show rate of return and not necessarily market movements of stocks comprising it. Index is compiled from: transmission companies, 5; transmission and distribution companies, 5; manufactured and mixed gas companies, 4; class "A" electric companies, 4; class "B" electric companies, 5.

Economists Point to Dangers in Rate of Increase in Consumer Debt

John F. Falvey
Financial Editor

● A VERY significant development of recent weeks has been the sharp narrowing of yields between bonds and common stocks. This reflects both an upward trend of interest rates and a rising surge in share prices, and as of this writing the difference in yields is approaching the vanishing point.

As of July 22, the yield on 125 industrial company common stocks, compiled daily by Moody's Investors' Service, had dropped to 3.61 per cent while the yield on this advisory organization's index of all corporate bonds had risen to 3.24 per cent, from 3.14 per cent earlier in the year.

The difference in yields of but little more than one-third of one per cent has been scaled down from 75 basis points in less than a month. At this level the differential between bond and stock yields is the smallest it has been since 1936. Just 3 years ago the average yield on Moody's industrial stocks was about twice that obtainable on all corporate bonds.

The narrowing of the return on debt and equities is due to a combination of increasing direct investment of individual savings in the share markets; the expanding volume of pension fund, investment company and other institutional funds in equities; the tremendous increase in home mortgages, whose competition for available investment funds has forced higher yields on corporate bonds; increasing share earnings; and the higher valuation being placed by equity investors on retained earnings as a source of growth.

The narrowing margin between bond and common stock yields has caused some of the leading investment advisory services to adopt an increasingly cautious attitude toward the stock market. They do not envision any serious break in share prices, but they are not counselling further investment of clients' funds unless the particular equity investment looks promising.

At the moment corporate profits are bettering the level of a year ago by at least 15 per cent. But whereas productivity has been increasing by about 3 per cent on the average for all industry, the recent management-labor agreements in the automobile and steel industries have increased wage and fringe benefits to hourly workers by an estimated 10 per cent.

This trend, per se, is not one which is conducive to an optimistic attitude toward the corporate profits outlook, in view of increasing keen competition in prices and of likely difficulty in passing along the higher costs, *in toto*, in present buyer's markets.

"But," as Dr. Jules I. Bogen of New York University hastens to point out, "any projection of corporate profits for 1955 must take fully into account the prospect that Federal income taxes may be lower. If the Geneva conference is at all successful in lessening pressure for defense spending, the way would be paved for a reduction in the corporate income tax to 47 per cent in 1956.

"With pre-tax corporate profits now somewhat over the $40-billion annual level, such a cut in the income tax rate would reduce corporate income taxes by roundly 2 billion.

"Such a tax reduction next year would go a long way toward offsetting the effect of higher wages and competitive pressure upon selling prices, and help to keep net profits after taxes close to the $20.5 billion annual level achieved in the second quarter of this year."

Meanwhile, business, financial and government quarters are viewing with increasing apprehension the consistent and sharp expansion in the volume of personal debt, which is expected to be $15-billion higher at the forthcoming year-end than it was at the close of 1954. An estimated 80 per cent of the rise is looked for in home mortgages and the balance in consumer debt.

The total of all consumer debt is now nearing the $115-billion mark, for an increase of 360 per cent above the $25-billion of such debt outstanding at the 1939 year-end.

Disposable personal income — the source of ability to service personal debt — has practically quadrupled in the same 16 years.

But it is significant that the ratio of consumer debt to disposable personnel income now is estimated at 44 per cent, compared with 36 per cent earlier.

While this ratio in itself does not make the volume of personal debt too unwieldly or difficult of servicing, economists are concerned with the *rate of increase* in such debt. They insist that the gain cannot be continued indefinitely, well in excess of the increase in disposable income, without endangering the economy.

It should be noted, too, that the people who are responsible for the increase in personal debt are not the ones who are accounting for the rise in disposable income, as credit men recently were warned by their national association. This association, in its warning to members, classified approximately $6-billion or so of personal debts as being in the shaky range.

Strong demand for funds developing from several directions is expected to result in a moderate increase in interest rates and in a further tightening of credit by late this year.

Both short-term and long-term borrowers are stepping up their money requirements. At the same time, the supply of funds may be curtailed, so that by the end of the year credit conditions could be tighter than at any time since the early months of 1953.

The dominant factor in the market for long-term funds is still the sustained and vigorous demand for mortgage money. While new housing starts recently have been at an annual rate of 1,300,000, compared with an earlier rate of 1,400,000 per annum, outstanding mortgage debt currently is increasing at a rate close to $15-billion for the year. This is a new high.

While the demand for funds continues heavy, the volume of savings available to absorb new mortgages and bonds is not being maintained. The Department of Commerce estimates that savings in the first quarter of this year were 7.2 per cent of disposable personal income, compared with 8.6 per cent in the corresponding period of 1954.

Both savings banks and commercial banks have reported smaller gains in thrift deposits this year than last.

Business outlays for new plant and equipment, meanwhile, continue their sharp increase. Expenditures for this purpose in the second quarter of 1955 were about 6 per cent above the figure for the comparable 1954 quarter, and are expanding at an even greater rate in the third quarter, according to estimates of the Federal Reserve Board.

The agency sets the 1955 second-quarter total at $7[illegible]-billion, which would compare wi[illegible] $6.9-billion for the corresponding 1954 period. Projection of the recent trend would seem to insure plant and equipment expenditures in the third quarter of this year at a level in excess of $7.5-billion.

See page 21 — GAS REPORTS

INDEX OF YIELDS
SELECTION UTILITIES STOCKS
See bottom of facing page.

American Gas Journal FEATURE

Courts Have Handed Down Varying Decisions on Utility-Extension Demands

By Leo T. Parker
Attorney at Law

During the past few weeks the higher courts in different stages rendered several outstanding decisions affecting gas companies. Knowledge of these interesting decisions may not only enable readers to avoid similar law suits, but the cited cases can be used to help win unavoidable suits.

"With your more-than 25 years of experience following practically all higher court decisions involving the gas industry," writes one reader, "what is the law with respect to gas utilities moving or relocating their mains and related equipment to allow contractors to perform work which they have already contracted to perform?"

The latest higher court decision involving this question is in Herman vs. Madison Gas and Electric Company, 58 N.W. (2d) 522. The testimony showed that Hermann, a house mover, contracted to move a house from one location to a new location and had secured a permit from the city to do the moving. Hermann requested Madison Gas and Electric Company to raise or relocate its wires and equipment to permit passage of the building.

In subsequent litigation, the higher court held that before agreeing to relocate its wires and accessories the utility company may compel Hermann to pay the costs of such temporary removal or might require Hermann to make a deposit to assure payment of the reasonable cost, and might require signing of a contract whereby Hermann would assume the cost of the workmen's compensation insurance for the company's men and also public liability insurance to cover claims by third parties.

Res Ipsa Loquitur

Discussion arises from time-to-time, over this question: What is the legal meaning of the term *res ipsa loquitur?*

This term means that when a person, or employee is injured, he can recover damages from the gas company WITHOUT PROVING that the injury resulted from negligence of the gas company's officials.

For illustration, in Foster vs Community, 277 Pac. (2d) 408, testimony showed that a person was injured. He sued for damages, alleging that the doctrine of *res ipsa loquitur* was applicable—which results in the employer being liable in damages without any proof that the injuries were caused by negligence of the employee.

The higher court agreed with these contentions and, in holding the employee entitled to recover damages, said:

"Appellant (employee) was entitled to the benefit of an inference of negligence arising from the happening of this unusual accident, because respondent (employer) was in a far better position to know what caused the instrument to be dangerous. We therefore conclude that the doctrine of *res ipsa loquitur* was applicable."

This court went on to explain that where the specific cause of the accident is known, the doctrine of *res ipsa loquitur* does not apply. However, in this case the causes of the injury were within the peculiar knowledge of the employer. Therefore, the court presumed that the employee's injuries resulted from negligence of the employer.

Law of Contracts

A question especially important to some gas officials who have written recently involves "as is," and similar contracts.

"Is it true, as I have heard, that a seller of gas appliances can avoid all future liability on purchased merchandise because the purchaser is so foolish as to sign a contract containing an 'as is' clause?"

Answer: It is true that a seller can avoid all liability to the purchaser of defective gas appliances if such purchaser signed a sale contract having an "as is" clause. According to a late higher court decision a seller has a legal duty to use "ordinary care" to deliver to the buyer merchandise reasonably worth the purchase price and safe for the purpose for which it is intended. Nevertheless, the legal duty of a seller, and consequently his liability, may be modified by contract. Hence, an "as is" clause in the sale contract relieves the seller from all future liability.

For illustration, in Pokra vs Wade, Inc., 63 N. W. (2d) 720, it was shown that the gas appliance sale contract contained this clause. "The undersigned purchaser states that he has examined the merchandise and is familiar with its condition and is buying it 'as is,' and with no guaranty as to condition or model. No oral representations have been made to the purchaser and all terms of the agreement are printed or written herein."

The purchaser was severely injured while using the appliance and brought suit for heavy damages.

The jury decided that the seller was liable, but the higher court reversed the verdict, and said:

"We can find no duty or breach in this case, because plaintiff bought the merchandise 'as is' without guaranty as to condition, thereby, as between themselves, releasing defendant from responsibility for such defects as it might have and himself assuming the risk. Having taken it subject to such defects as it might have, he cannot throw liability arising out of its defects back on the seller. We see no reason in public policy why the parties may not, as between themselves, make such a contract, and that they did so here is undeniable."

Employment Contract Liability

W. S. Bailey of Jacksonville, Florida, asks, "Recently I discharged an employee whom I had hired for one year on verbal contract. I discharged him at the end of the first month because my son took his job. This employee says he will sue unless I pay him. What is your advice?" It is well established law that an employee who is wrongfully discharged from a valid employment may recover damages from his employer. However, it is very infrequent that the courts award so much damages as were awarded in the late case of Lewis vs Steef, 220 Pac. (2d) 769. Here the testimony showed that Lewis was employed for one year at $500 per month. After working only 3 months Lewis was discharged. Lewis alleged that he had been at all times "ready, willing and able" to perform the employment contract and that he was damaged in the sum of $26,000 because of the employer's breach of the contract. It is interesting to observe that the lower court awarded Lewis $26,000 damages.

The higher court approved the verdict, saying, "It cannot be said upon the record before us that the sum of $26,000 . . . was excessive."

American Gas Journal FEATURE

Old Days Recalled . . . from

AMERICAN GAS JOURNAL

EST. 1859

90 YEARS AGO

AUGUST 1865

SCHOOL OF MINES—COLUMBIA COLLEGE. *The School of Mines which we urged the establishment of in our early numbers, has been successfully organized at the above College, and we have recently received a pamphlet setting forth the object, a list of officers, and the course of instruction.*

MR. EDITOR—*In your issue of the 17th ult. you complain—and not for the first time—of the indisposition of Gas-men generally to communicate in writing the result of their experience, and your correspondent, "Sortia" [see GAS JOURNAL, July 1955, p. 27] actually challenges you "to produce a single article emanating from any Gas corporation . . ." The President, Secretary or Treasurer . . . is in almost every case identified with business of his own which takes the most of his time and attention . . . his knowledge of the detail of Gas manufacture and the principles involved in it, is entirely superficial . . . The Superintendents . . . are generally young men, selected without any regard to their scientific attainments, but for good common sense, industry and sobriety . . . Gas companies in this country . . . don't pay enough money to secure the services of first class men to superintend the operations of manufacture, distribution, etc. Occasionally you meet an intelligent, even able man, Superintendent of some Gas works. An investigation . . . will discover that he is engaged in some extra business, or speculation, which takes his time and attention, and which is forced upon him because the Directors of his company are so short sighted as to order the amount allowed for salaries to be so small, or so divided, that an officer who has all the honor is paid a salary for doing nothing, while another officer is paid a small salary for doing everything . . . There are some good reasons for the freedom of discussion among Gas-men in England, which may perhaps be presented at another time. Yours, etc.,* REYNOLDS, *New York, August 12th.*

TO GAS COMPANIES. *A gas engineer of thirteen years experience, desires a re-engagement. He refers, by permission, to Chas. Roome, Esq., President Manhattan Gas Co.; F. T. Willis, Esq., President Savannah Gas Co.; Ambrose L. White, Esq., Engineer Metropolitan Gas Co. Address, James R. Smedberg, 186 Seventh Avenue, New York City.*

GAS IN LONDON. *The public meeting of ratepayers and gas consumers convened by the Lord Mayor of London, has been held, and resolutions unanimously passed to the effect that the supply of gas ought to be placed in the hands of local authorities, so that, after lighting the public lamps the private consumer might get gas at cost price; and that the Gas Act of 1860 ought to be repealed.*

50 YEARS AGO

AUGUST 1905

ST. LOUIS EXPOSITION 1904, committee on Exhibit makes final report to the Directors of the Western Gas Association. Fred R. Persons, the representative in charge during the 7 months' period, writes, "The space in the Palace of Liberal Arts at the World's Fair that has been known as the 'Gas Place' is no more. The exhibits have all been packed and shipped. We have tried to make the public understand that the gas industry is not a thing of the past, but a very live factor in the to-day and everyday commercial life."

WHEELING, W. VA., suspects a conspiracy is being hatched to sell out her municipal gas property. It might be to her advantage for the conspirators to be successful.

WHEN EMPLOYEES of the Milwaukee (Wis.) Gas Light Company received their pay on July 25th, the received additional compensation checks equalling 6 per cent. of their wages for the past 6 months.

THE COLUMBUS (O.) GAS COMPANY is again making pitch as they were not able to sell their tar to as good advantage.

PRESIDENT COWDERY [American Gas Light Association] informs us that Prof. B. H. Meyer, of the University of Wisconsin, will lecture before the American Association . . . in October. It is expected that Prof. Meyer will open the meeting . . . with his lecture, which will be upon some economic subject, not year clearly determined.

THE BRONX GAS AND ELECTRIC COMPANY, of West Chester, N. Y., has just completed a 1,000,000 cubic foot per day plant, from coke bins to governor . . . The construction companies have completed their work as follows: The United Gas Improvement Company, water gas apparatus; the Gas Machinery Company, reversing duplex purifiers; the American Meter Company, station meter; Roots Manufacturing Company, exhausters; R. D. Wood & Co., 75,000 cubic foot holder and 500,000 cubic foot storage holder. The plant presents a fine appearance and has been well planned for economic and successful operation.

PLANS FOR A TUNNEL under the Milwaukee river . . . by the Engineer of the Milwaukee Gas Light Company . . . forwarded to the government's engineering office at Washington. The tunnel will be large enough to carry all of the Company's mains.

25 YEARS AGO

AUGUST 1930

EDITORIAL: *It would seem that electricity is the form of thermal energy that might be very energetically pushed, particularly for cooking, in the near future . . . From nearly every angle—cost, ease and beauty of application, dependability—gas would seem to easily outstrip its competitors, so-called. Only gross stupidity and allowing itself to be tricked by catch phrases will cause its now increasing application and popularity to wane.*

ANNEALING WITH GAS *in a Brass Finishing Plant, is the title of an article by S. P. Rodgers, industrial fuel representative, Consolidated Gas Electric Light and Power Company of Baltimore.*

ETHYL MERCAPTAN *found to be an efficient warning agent for detection of leaks in natural gas distribution system, according to another article.*

BROOKLYN UNION GAS COMPANY, *in a newspaper ad for Electrolux said, "Enjoy your radio without interference—The gas refrigerator is noiseless."*

MORE AND MORE *gas companies are advertising house heating during the summer months.*

Gas Industry news

George S. Young, right, president of the Quarter Century Club, receives a gold watch from Alfred A. Koppe, paymaster, at ceremonies marking founding of the club in New York.

Columbia Gas System Forms Quarter Century Club

The president of Columbia Gas System received a watch from the paymaster when both became charter members, along with 37 others, in the newly formed Quarter Century Club for the New York offices.

With the forming of The Columbia Gas System, Inc., and the Columbia Gas System Service Corporation Quarter Century Club, President George S. Young, right, received his gold watch from Paymaster Alfred A. Koppe.

Koppe, whose 48 years of service give him the longest tenure in the New York offices, was elected president of the new club.

Speakers Are Selected For Appalachian Gas Course

D. A. Hulcy, president, Lone Star Gas Company, and past president of American Gas Association and U. S. Chamber of Commerce, will present the principal address at the Appalachian Gas Measurement Short Course, August 29-31, at West Virginia University, Morgantown.

Thomas R. Weymouth, retired vice president, Columbia Gas System, and originator of the orifice with flange taps will be the other featured speaker on the opening session.

The purpose of the course is to provide information on application, operation and repair of natural gas quantity measurement and pressure regulation equipment. The latest developments of this equipment will be exhibited by 42 of the nation's leading gas equipment manufacturers. Instructors for the classes and forums are technical experts from industry, research and universities.

A. M. Hutchison, measurement superintendent, Ohio Fuel Gas Company, is general chairman and Howard S. Bean, National Bureau of Standards, is the program chairman.

Washington Natural Gas Is Name of Coast Merger

Shareholders of Seattle Gas Company and Washington Gas and Electric Company have voted overwhelmingly in favor of merging the companies.

Results of shareholder voting at special meetings were announced jointly by Walter S. Byrne, president, Seattle Gas, and Allen Peyser, president, Washington Gas and Electric. Both officials reported that approval was virtually unanimous.

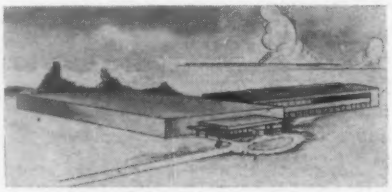
The name of the resulting company will be Washington Natural Gas Company.

The combined company will serve Seattle, Tacoma, Everett, Olympia, Renton, Tukwila, Kent, Auburn, Algona, Pacific, Sumner, Puyallup, American Lake, Dupont, Fort Lewis, Union Mills, Lacey, Tumwater, Centralia and Chehalis.

With the advent of natural gas, in 1956, service will also be established in Bothell, Kirkland, Redmond, Bellevue and Clyde Hill.

Rockwell Begins Plant In Russellville, Kentucky

Ground has been broken for construction of the new parts plant in Russellville, Kentucky, for Rockwell



Manufacturing Company. Cost of the new plant is said to be in excess of $1,000,000, exclusive of production equipment.

The plant, slated for completion early next year, will turn out parts for all Rockwell products. It will be a one-story building with an exterior of masonry and insulated aluminum panels, and interior walls of glazed tile. It will be entirely heated and cooled with gas.

Gas Union Meets in New York September 25-30

The sixth conference of the International Gas Union will be held in New York, September 25-30. The union is comprised of representatives of national gas associations of 17 countries or regions: United States, Germany, Belgium, France, Italy, Canada, Denmark, Saar, Norway, Spain, Switzerland, Sweden, England, Japan, Australia and Netherlands. It is expected that delegates from each nation will attend the conference.

President of the union is Robert W. Hendee, formerly president of Colorado Interstate Gas Company and of American Gas Association. Honorary presidents are A. Baril, Paris; H. Müller, Munich; M. Brabant, Brussels.

Members of the entire gas industry are invited to participate. Registration fees for U. S. gas men will be $25. Printed sets of all papers to be presented at the conference will be available at AGA headquarters before the conference opens at a cost of $20 per set.

A committee on arrangements, headed by E. W. Doebler, president, Long Island Lighting Company, has arranged a program, which includes features for the ladies. Bruce A. McCandless, AGA, is secretary of the committee.

The conference will open informally September 25, with a reception for the delegates. On the 26th, the program includes a boat trip around Manhattan Island, a meeting of the International Gas Union Council, and a dinner for council members. Formal greetings will be extended on the 27th from officials, including F. M. Banks, AGA president, and R. H. Touwaide, Brussels, general secretary of the union. E. Carl Sorby, vice president, George D. Roper Corporation, will deliver the opening address. Separate meetings will be devoted to transmission and distribution and to gas production.

Utilization and gas production will be topics for sessions on the 28th, with a luncheon sponsored by Consolidated Edison Company. A visit to The Brooklyn Union Gas Company and a formal banquet and entertainment also are included on the program for that day. The session of September 29 will be devoted to educational subjects and reports on requirements for international standards for gas appliances and gas conditioning. Col. W. F. Rockwell will deliver a formal address to close the business meeting. For Friday, September 30, a field trip to the Harrison plant of Public Service Electric and Gas Company, New Jersey, is scheduled.

Seattle Conference Helps Northwest Prepare for Gas

Arrival of natural gas in the Pacific Northwest next year will bring tremendous opportunities and also stern challenges, delegates to the Pacific Coast public relations conference, in Seattle, were informed June 20 and 21. The workshop-type conference was sponsored jointly by Pacific Coast Gas Association, American Gas Association, Gas Appliance Manufacturers Association, Independent Natural Gas Association of America, and National Council for LP-gas Promotion. Special features of the conference were two panel discussions.

R. G. Barnett, vice president, Portland Gas and Coke Company (standing, in photo), was moderator for a panel on natural gas promotion.

Nathan H. Gellert, Jr., moderated a panel on natural gas changeover.

Others on this panel were Brigham; C. C. Westmoreland, supervising engineer, Southern California Gas Company; Claude S. Hazel, assistant manager, customer service department, Philadelphia Gas Works; W. L. Shomaker, vice president, Northern Natural Gas Company.

Seated, left to right: Robert M. Brigham, assistant vice president, Springfield Gas Light Company; Eugene F. Martin, vice president, Carl Byoir and Associates; W. M. Jacobs, vice president and assistant general manager, Southern California Gas Company; Vincent R. Fowler, vice president, Bozell and Jacobs, Inc.

Nils T. Sellman Retires From Con Ed of New York

Nils T. Sellman, on Aug 1, completed a distinguished career in the gas industry and retired from Consolidated Edison Company of New York, as assistant vice president of sales.

N. T. Sellman

Sellman has always been most closely associated with gas utilization and promotion. As assistant secretary-manager of American Gas Association, in the early 20's he was active in the formation of its testing laboratories. He was the first person to receive the AGA Charles A. Munroe Award, now the AGA Distinguished Service Award, for his contributions to development and sales promotion in the gas appliance field. He was prominent in the evolution of the certified performance gas range and served as chairman of the original CP range development committee in 1936.

Shortly after his graduation from Stevens Institute of Technology, Sellman joined Consolidated Gas Company in 1913.

His work as test engineer of gas appliances was interrupted 3 years later by military service. He was on the Mexican border with the 71st Regiment, and then entered World War I in the Coast Artillery Corps. He was engineer of power plant equipment at Fort Totten, was then commissioned a lieutenant and served in France. His unit, the 30th Engineers, later became the first Gas Regiment.

After the war he resumed his work with Con Gas, but 2 years later he accepted an appointment as service engineer of AGA.

In the mid-20's Sellman returned to Con Gas as engineer of utilization. He soon became assistant secretary of the company, and then director of sales and utilization.

He served as director of several gas companies in the Con Gas system before its merger with New York Edison in 1936. At that time he was elected assistant vice president of sales for Con Edison, Brooklyn Edison and Queens Electric. In this post he devoted himself to the sales of electricity as well as of gas. From 1944 to 1948 he was vice president of the former Westchester Lighting and Yonkers Electric companies.

He has served on many AGA committees, including the testing laboratory managing committee, of which he was chairman, and various research, industrial and commercial committees. He was a director of the AGA for 5 years, beginning in 1937.

A professional engineer, Sellman is a member of the American Society of Mechanical Engineers, the American Society of Heating and Air Conditioning Engineers, and the Society of Gas Engineering. For 29 years he has been a member of the Society of Gas Lighting.

Fisher Governor Acquires Thermo Instrument Company

Fisher Governor Company has acquired the assets of Thermo Instruments Company, Belmont, California, manufacturers of capacitance probe type liquid level measurement instruments. D. M. Comb, former president of Thermo, is now associated with Fisher Governor Company in Marshalltown, Iowa.

Woodworth Leaves Spokane; Gellert to Take Post

Frank A. Woodworth announced his retirement, late last month, as president and general manager of Spokane Gas and Fuel Company, and named as his successor Nathan H. Gellert, Jr., vice president, distribution, Seattle Gas Company. Woodworth said he will remain active in company affairs as director and consultant to the company. The change is effective September 1.

Gellert went to Seattle Gas in 1945 as assistant to the general manager, later becoming utilization manager and then superintendent of distribution and utilization in 1949. He was made vice president in charge of distribution in 1951.

He entered the gas industry as assistant to the traffic manager of the Central Fuel Corporation and in 1939 became assistant to the engineer for Gas Corporation of Michigan, later transferring to LeMars Gas Company. During 1940 he was appointed manager of Independence Gas Company. He has been manager of North Carolina Gas Corporation. In 1943 he became president of Atlantic Gas Corporation and resigned in 1945 to go to Seattle.

Wentworth Smith Heads Superior Gas Meter

Wentworth Smith, vice president, Neptune Meter Company, has been elected president of Superior Meter Company. Neptune acquired Superior June 1.

Gabriel Powers, formerly head of Superior, continues as vice president and general manager. Arthur A. Hanson, treasurer of Neptune, has the same responsibility with Superior, which will be operated as a wholly-owned, but independent subsidiary.

Other Superior officials are Frederick W. Gotschling, vice president, operations; Raymond G. Kremer, vice president, production; Allen D. MacLean, chief products engineer.

Distribution of Superior gas meters is being integrated into the Neptune sales organization.

Getting into spirit of things while installing gas meter at Disneyland by wearing Davy Crockett caps are these members of a Southern Counties Gas Company service crew.

Disneyland Uses Gas to Recapture Days-Gone-By

When delegates to the combined American Gas Association-Pacific Coast Gas Association convention gather at Disneyland, the new West Coast entertainment center near Los Angeles, they will get a picture of the growth of their own industry.

One of the first sights in Disneyland will be Main Street, U. S. A., a recreation of American small-town life in the gaslit era of the turn of the century. The gas lamps illuminating Main Street will be lit each evening by an old-fashioned lamplighter.

Dozens of restaurants, sandwich counters and specialty houses will offer food to visitors; hardworking gas will be used predominantly in its preparation.

Two unique restaurants fronting on the hub of Disneyland will rely on gas for cooking, space heating and water heating. One is the Buffeteria, a new concept in food service combining the better features of buffet, cafeteria and restaurant. The other is the elegantly-appointed Red Wagon Inn, a recreation of the Gay Nineties restaurant typified by Delmonico's in Old New York.

Perhaps the most unusual role for gas at Disneyland is its use in conjunction with a scaled-down version of an old-time freight train, which will take passengers on rides around the grounds of Disneyland. The train will be diesel-powered and gas will be used every morning to fire the engines for the day's runs.

Sales Rumors Unfounded Alabama Gas Board States

"The Board of Directors of Alabama Gas Corporation believe it necessary in the interest of the company's security holders to make a public statement concerning the widespread publicity being given to reports that the company's properties are to be sold." That declaration opened the official statement released on Aug. 2.

"A group of the company's common stockholders has recently outlined to management a plan under which the gas distribution systems of the company would be sold from time to time to public bodies, and have asked the directors' attitude toward that plan.

"No offer to purchase any of the company's property has been solicited or received by the company and no one has been authorized by the company to solicit any such offer. The attitude of the board of directors is that it cannot undertake to say what it might do when, as and if an offer is presented to it other than to say that, while it does not invite any offer to purchase its property, any such offer will be considered on its merits.

"Counsel has advised the board that if it consider any sale to be to the benefit of stockholders, such sale may be made only if all the conditions precedent to valid sale are met, including those expressed in the applicable Alabama statutes.

"In connection with the statutory requirements," the statement said in conclusion, "counsel have rendered their opinion that any sale of the company's operating properties pursuant to a plan to sell all the property, whether at one time or from time to time, would require among other things the affirmative vote of not less than 80 per cent in value of the capital stock of the company."

Cleveland Trencher Promotes Three in Its Organiation

The Cleveland Trencher Company has announced the promotion of E. B. Volmar to vice president, manufacturing, and the appointments of Clifford P. Morgan as sales manager and David L. Raymond as chief engineer.

Works manager for the past 5 years and an employee of the company for more than 15 years, Volmar also has been elected to the company's board of directors.

Morgan steps into the post previously filled by John A Penote, now vice president, sales.

Raymond succeeds Albert R. Askue who retired recently after serving as chief engineer for more than 15 years.

Bell Is VP of Portland Gas

James F. Bell has been advanced to executive vice president, Portland Gas and Coke Company. Bell joined the company in 1946 as assistant to the president. He was elected a vice president in 1949 and a director in 1950. He also is a director of Pacific Coast Gas Association.

2 Awards to Northern Indiana PSC

Northern Indiana Public Service Company received 2 national utility publication awards recently.

The award-winning publications were the employee magazine *The NIPSCO Picture*, and the company's annual report to stockholders for 1954.

The employee publication won second place and the annual report third place, in the annual nation-wide Better-Copy-Contest sponsored by Public Utilities Advertising Association. The contest is said to be the oldest competition in the utility publication and advertising field. Over the years, it has grown in importance and interest until this year more than 2060 entries were submitted by utility companies.

Cascade Natural Construction Program Plans Underway

Engineering for Cascade Natural Gas Corporation's new construction program in twenty-three Pacific Northwest cities has been completed. The company plans to ask for bids for some construction in about October 1, with work to start as soon thereafter as possible.

Time schedule for the construction of the company's natural gas distribution system in each of its cities, has been broken down into eight general areas, with 30 individual projects.

Some contractors may handle several projects, or contracts may be awarded separately for each project—depending upon the outcome of bids. Wherever possible local contractors will be used and materials purchased in the Pacific Northwest, company officials have stated.

Cascade is franchised to serve Anacortes, Bellingham, Bremerton, Burlington, Clarkston, College Place, Grandview, Granger, Kennewick, Port Orchard, Prosser, Shelton, Sunnyside, Toppenish, Walla Walla, Wapato, Wenatchee, Yakima, and Zillah in Washington state; Eugene, Pendleton and Springfield in Oregon, and Lewiston, Idaho. Cascade anticipates serving ten additional Northwest cities.

Construction will start first in the Pendleton, Walla Walla and Tri-City areas. Construction in the Walla Walla, Kennewick, and Pendleton areas will take approximately five months; Yakima, and Yakima Valley areas, six months; Bellingham and Coastal areas, approximately four months, and Wenatchee and other areas, about three months.

Design and supervision of construction is being done for Cascade by the engineering firm of Fish Service and Management Company, Houston, Texas.

W. C. Rueckel Is Vice President, Manager of Koppers Division

Walter C. Rueckel, vice president, Henry J. Kaiser Company, has been elected vice president and general manager, engineering and construction division, Koppers Company, Inc.

Dr. Rueckel, who left Koppers in 1951, returns to fill the vacancy created by the death of George M. Carvlin.

In his new position, Dr. Rueckel will direct all Koppers engineering and construction activities.

He joined Koppers, in 1935, as a research engineer and refractories consultant in the engineering and construction division. In 1938, he became associated with Battelle Memorial Institute, but returned to Koppers as a sales engineer in 1939. After that he was successively, general superintendent and Eastern district sales manager of the company's engineering and construction division. In 1947, he was appointed a vice president in Koppers division.

PGCE Names Vice Presidents

Shermer L. Sibley, engineer and assistant to Norman R. Sutherland, president, was appointed vice president and assistant general manager of Pacific Gas and Electric Company. At the same time, Robert R. Gros, manager of advertising and publicity, was appointed vice president, with responsibility for informational activities and special assignments by the president. Both appointments were effective August 1.

AGA Nominates Officers and Directors for Next Year

The general nominating committee of American Gas Association has presented a list of executives from gas utility, pipe line and manufacturer company members as its slate of general officers, directors and section officers for submission at the AGA annual convention.

The chairman of the general nominating committee is Everett J. Boothby, president, Washington Gas Light Company.

Offices to be filled are those of president, 2 vice presidents, treasurer, 15 directors and 11 section chairmen and vice chairmen. The list of nominees follows:

President: Dean H. Mitchell, president, Northern Indiana Public Service Company.

First vice president: C. H. Zachry, president, Southern Union Gas Company.

Second vice president: A. W. Conover, president, Equitable Gas Company.

Treasurer: Vincent T. Miles, treasurer, Long Island Lighting Company.

Directors: 2-3-year terms expiring October 1957:

*M. A. Abernathy, vice president, United Gas Pipe Line Company.

P. E. Beckman, vice president, Pacific Gas and Electric Company.

R. E. Crawford, president, Minnesota Valley Natural Gas Company.

Lyle C. Harvey, senior vice president, Carrier Corporation.

*John E. Heyke, Jr., president, Brooklyn Union Gas Company.

*D. E. Karn, president, Consumers Power Company.

*Wister H. Ligon, president, Nashville Gas Company.

Chester L. May, senior vice president, Lone Star Gas Company.

Robert W. Otto, president, Laclede Gas Company.

*F. T. Parks, vice president, Public Service Company of Colorado.

J. C. Peterson, president, Manufacturers Light and Heat Company.

W. F. Rockwell, Jr., president, Rockwell Manufacturing Company.

Edward H. Smoker, president, United Gas Improvement Company.

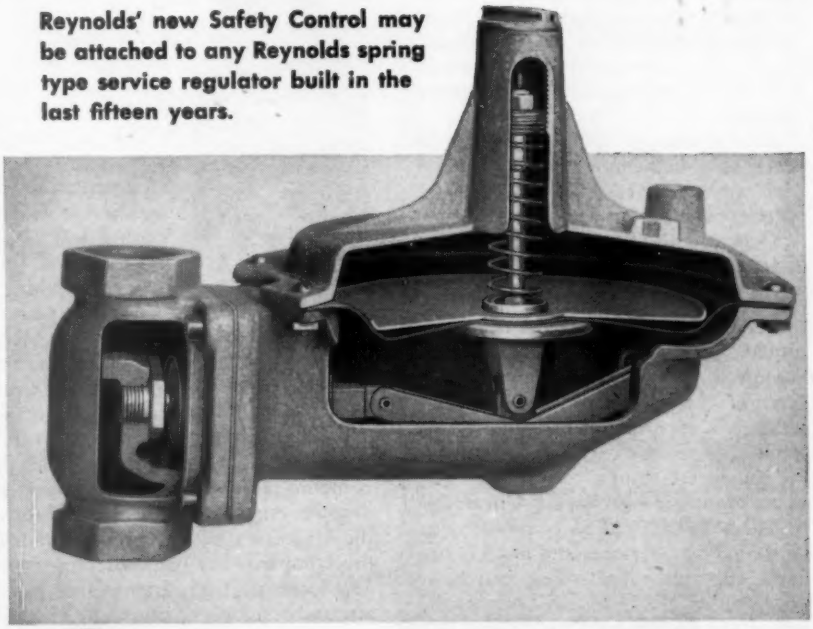
*J. Theodore Wolfe, executive vice president, Baltimore Gas and Electric Company.

D. K. Yorath, general manager, Northwestern Utilities, Ltd.

*Renominated.

Reynolds OFFERS A NEW PERFECTED SAFETY CONTROL FOR ALL SERVICE REGULATORS

Reynolds' new Safety Control may be attached to any Reynolds spring type service regulator built in the last fifteen years.



GAS CONTROL SINCE 1892

* **Prevent regulator from falling in a wide open position, thus limiting the amount of gas the safety seal has to pass.**
* **Enable the gas company to set the regulator for a certain demand and if a customer increases that, his outlet pressure would drop which would cause him to call the company and they can find out what his real demands are.**

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA

Gas Industry PERSONALS

James H. Marks Elected Equitable Gas Vice President

James H. Marks, operating manager, Equitable Gas Company, was elected vice president, operations, at a recent meeting of the board of directors. In his new post, Marks will have charge of the automotive equipment, distribution, compressing stations, land and real estate, production and transportation, and system operation departments.

James H. Marks

He started at Equitable Gas Co. in 1935, as a cadet engineer in the operating manager's department, and has since served the company as district supervisor, foreman and assistant superintendent, distribution department; fieldman, planning and development department; superintendent of the company's North Side division of the distribution department; general superintendent of distribution; and operating manager.

Marks entered military service in 1941 as a lieutenant, Field Artillery, and was discharged as a lieutenant colonel in 1945.

Charles Ingram, Jr., Upped By Oklahoma Natural Gas

Charles C. Ingram, Jr., has been promoted to vice president of the land and geological department of Oklahoma Natural Gas Company. He has been serving as superintendent of the Oklahoma City district for the company. He joined Oklahoma Natural in 1940 upon graduation from the University of Tulsa. In 1951 he was promoted to assistant chief engineer and in 1952 became superintendent of gas purchase and reserves. He became superintendent of the Oklahoma City district last year.

In Oklahoma City, Ingram is being succeeded by James E. Tyree, assistant operating superintendent in the Oklahoma City district.

William Locke Named Head National Fuel Gas Company

William H. Locke has been elected president of the National Fuel Gas Company, a gas firm holding company, to succeed Leigh A. Brown, who retired as head of the company June 30.

Locke has been a director and vice president of National Fuel Gas since 1943. He has resigned his post as president of Pennsylvania Gas Company, a National Fuel Gas subsidiary. Brown, who has been with the company and its subsidiaries since 1912, will remain as a director and consultant.

Stuart H. Nichols has been named a vice president of the company.

Sprague Meter Company Names Three to Organization

F. L. Morgan

Robert Clark

C. R. Woodrum

The Sprague Meter Company has announced appointment of three men in its West Coast division. Frank L. Morgan is Western regional manager, with offices at 444 Market Street, San Francisco. He has been associated with H. R. Basford Company for the past 15 years as manager of the Sprague Meter department. Morgan will co-ordinate Sprague operations in the West Coast territory. He holds a degree in mechanical engineering.

Robert Clark who has been with the company since 1951, is now Western division engineer. He is a graduate of the University of Bridgeport and with the company has received progressive appointments from engineering assistant and research engineer, to his present promotion. During the past three years, he has been active in gas meter design, maintenance and service procedure at the Universities of West Virginia and Oklahoma. He will headquarter in Los Angeles, California.

Charles R. Woodrum is sales engineer at Sprague's San Francisco office. Woodrum will cover the central area of the West Coast region, consisting of Northern California, Southern Oregon and Nevada. He was formerly associated with the E. I. du Pont de Nemours Company. He received his education at McKinley Tech in Washington, and at Washington and Lee University in Virginia.

Texas Gas Transmission Promote Five Employees

William B. Threlkeld has been appointed director of the land and lease department of Texas Gas Transmission Corporation, succeeding John W. Polkinghorn who retired August 1 after 26 years with the company.

W. B. Threlkeld

In his new position, Threlkeld will direct the negotiations for rights-of-way and purchases of property for company facilities throughout the nine-state operating area of Texas Gas.

The new director has served as assistant to the director for four years. He joined the pipe line department of Texas Gas in 1949. Threlkeld also has been appointed an assistant secretary of the corporation. He is a graduate of the Southern Law University in Memphis.

Ralph W. Thacker, manager of employee relations, Texas Gas Transmission Corporation, has been appointed assistant to the secretary of the corporation.

Joining Texas Gas in 1949, as manager of general office services and the reproduction department, Thacker took over the duties of manager of employee relations in 1950. He is a graduate of Oglethorpe University.

Texas Gas has promoted three employees of the Shreveport gas supply department to supervisory positions.

Louis S. Arrington has been named supervisor of geologists. Alfred E. Little has been promoted to supervisor of proration, and Robert D. Northcutt supervisor reservoir engineering.

Arrington, a geology graduate of the University of Oklahoma, and Little, a graduate of Texas A&M in mechanical engineering, each became associated with the company in 1950. Northcutt, who majored in petroleum engineering at Louisiana State University and studied civil engineering at Oklahoma A&M, joined the company in 1951.

Republic LH&P Advances G. M. Flaherty in New York

Gerald M. Flaherty has assumed charge of the Niagara, New York, district of Republic Light, Heat and Power Company. He has been superintendent in Batavia, New York, for the past 6 years. Headquarters for the new post will be in Tonawanda and the region of which Flaherty will have supervision includes Niagara Falls, Kenmore and Tonawanda. He will be succeeded at Batavia by Gary Skeels.

Fred A. Kaiser Now VP Michigan Consolidated Gas

The election of Fred A. Kaiser as vice president and sales manager of Michigan Consolidated Gas Company was announced after the company's board meeting last month. Kaiser, former president of Detroit Michigan Stove Company assumed his duties August 1.

Fred A. Kaiser

A native of Detroit, Kaiser had been associated with the gas industry since 1931 when he joined the stove company as a field salesman. He became sales manager in 1938 and assistant to the president in 1943. Kaiser was made a vice president in 1945 and president in 1954. Previously, he was associated with the automobile industry.

Kaiser is a trustee of the Institute of Appliance Manufacturers, a former director of Gas Appliance Manufacturers Association and past president of the Detroit Sales Executives Club. He was also elected to the "Hall of Flame" of the commercial section of American Gas Association.

PERSONALS—in brief

Tom Streight is western division manager, *RCA Estate.*

Jack D. Bateman promoted to manager, market research, *Rockwell Manufacturing Company.*

Walter D. Betsch is now vice president, rates, *Ohio Fuel Gas Company.*

I. L. Briscoe named manager, rate department, *Ohio Fuel Gas Company.*

William J. Davies now district manager, Cleveland office, *Worthington Corporation.*

Fred H. Deckman elected assistant treasurer, *Columbia Gas System Service Corporation.*

J. C. Didway, appointed general representative, *Ohio Fuel Gas Company.*

H. A. Dietrich now manager, *Libertyville division, Burgess-Manning Company.*

F. C. Duerr is manager of Chicago district, *Burgess-Manning Company.*

Kenneth E. Haase appointed purchasing agent, *Consolidated Natural Gas Company.*

Richard C. Harder promoted to Columbus district special representative, *Ohio Fuel Gas Company.*

Henry A. Jackson, Jr., appointed assistant secretary, *New York State Natural Gas Corporation.*

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Another HAYS First

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ERIE, PA.

new | Gas Industry equipment

Abrasive Cutting Machine—Beaver

An abrasive cutting machine for metalworking plants or contractors for cutting all shapes and types of materials is made by Beaver. The high speed abrasive wheel cuts through soft or hard metals, leaving a smooth surface, according to the company.

Variance of shape or material is reportedly no hindrance to unit. Thin-walled steel aircraft tubing, soil pipe, galvanized steels, angles, structural members or solid bars are said to be cut with efficient speed. In field demonstrations, 2-in. steel pipe was cut in 5 sec, 4-in. cast iron soil pipe in 6 sec, and cold-rolled 2-in. steel in 20 sec.

Abrasive cutting machines are available with following capacities: a 20-in. cutting wheel and a wheel speed of 2,300 rpm which can cut a 6-in. pipe or 2½-in. solid rod or bar; a 14-in. wheel and a wheel speed of 3000 rpm which can cut 4-in. pipe or a piece of 2-in. solid rod or bar.

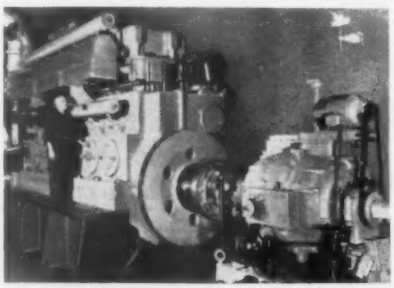
Both machines have permanently sealed, double row ball bearings to insure easier operation and longer life. The model with the 14-in. wheel has replaceable, oilless sleeve bearings

Models No. 14 and 20, Speed Cut. Beaver Pipe Tools, Inc., Warren, Ohio.

Power Engines—Worthington

A completely new line of power engines has been introduced. The new engines are a high pressure turbo-supercharged, 4-cycle design, rated from 1360 to 5000 hp at 450 rpm.

Largest of the line is a 16-cylinder V-engine which is said to develop twice as much power as present diesels of the same weight and dimensions previously built for similar services. The



line was developed as a result of study of market requirements for both direct drive and electric power generation.

The tri-power arrangements permit use of the new engines as oil diesel, dual fuel diesel, or spark ignition gas.

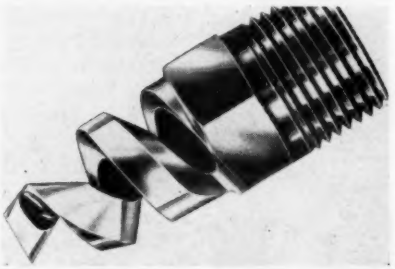
The manufacturer claims its new engine to be the only low speed, heavy duty, high pressure turbo-supercharged engine in the United States designed and built for a capacity exceeding 200 psi bmep.

One of the unique features built into the line is interchangeability of major parts between the in-line and the V-engines, such as cylinders, head, rods, pistons, bearing and fuel injection equipment. Other major features include: combustion chamber designed to burn most efficiently the larger quantities of fuel required for the higher power output, four valves, 2 inlet and 2 exhaust mounted in cylinder head, for less flow friction and higher volumetric efficiency, and symmetrical dished piston design, flood cooled, for maximum strength and uniform cooling.

SW 14 Line. Worthington Corporation, Harrison, New Jersey.

Fog Nozzles—Bete

A new series of fog nozzles for fixed fire protection and other industrial applications, these nozzles are said to combine the advantages of high resist-



ance to clogging, simplicity of design, long reach of the fog pattern and uniform atomization.

The nozzles employ two spiral turns, producing an inner and outer cone which results in uniform coverage over a 90 deg cone. They are made from one small piece of ⅞-in. hex metal and have no internal parts. It is claimed that particles in the spray smaller than the orifice will pass through the nozzle without clogging.

N Series TV-Cone. Bete Fog Nozzle, Inc., 309 Wells Street, Greenfield, Massachusetts.

Gooseneck Trailer—LaCrosse

A new gooseneck trailer which can be loaded or unloaded by one man, without skids, has been introduced. The new trailer permits disconnecting the gooseneck automatically from the rest of the trailer. The gooseneck contains a hydraulic unit which raises and lowers the trailer platform and which is used to raise the rear wheels of the tractor for changing tires, or to lower the trailer bed for passing low wires or underpasses. Main advantage of the new unit, according to the manufacturer, is that the only mechanical connection between gooseneck and trailer is a standard inverted fifth wheel in the base of the gooseneck, which attaches to a king pin on the front of the trailer platform.

The self-contained hydraulic system in the gooseneck consists of a vane type pump with double acting cylinder, actuated by a small air-cooled gasoline engine. After being lifted to travel position, the trailer platform is locked mechanically by means of a rigid torque tube and double toggle arm arrangement, which is independent of the hydraulic system.

The current model is 33-ton capacity, spring-mounted, with 10 by 20 14-ply tires and a 16 ft by 8 ft loading surface, which can be increased to 10 ft width by extension brackets.

Model LXC. LaCrosse Trailer Corporation, LaCrosse, Wisconsin.

1897 1955

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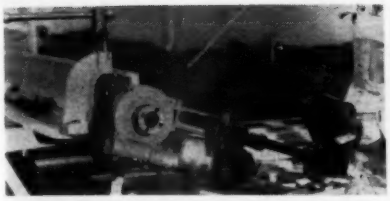

Pipe Threader—Velocity Power

Quick and easy pipe threading on the job is now said to be possible through this portable power pipe threader. Slow hand-threading jobs may now be done in seconds with this power driven threader the company reports. Simple adapters and a speed reducer make it possible to handle pipe from ¼ to 10 in.

The theader weighs 20 lb and is 27 in. in length; it is easily carried. It is designed and constructed for one hand operation.

Apply the threading dies to the tool, position the tool, then press a button and the power unit drives the cutting dies. It is equipped with a ¾ hp motor and a toggle switch to provide reversible power. The tool may be used as an auger, for boring post holes, driving bolts and nuts, opening valves and as a hoist for weights up to 500 lb.

Lawco Junior Portable Pipe Threader. Velocity Power Tool Company, 201 North Braddock Avenue, Pittsburgh, Pennsylvania.

Patent — Gas Machinery

The Gas Machinery Company, Cleveland, Ohio, through inventor-assignor Paul L. Born, has been issued a patent covering the process and apparatus for converting water gas sets to high Btu oil gas. The patented arrangement is generally identified as single burner, bottom-fired. It basically covers that type of oil gas installation in which an oil burner is inserted in an existing water gas generator.

Chain Wrench—Reed

A completely new design in chain wrenches for plumbers, pipefitters and maintenance men this new wrench features a chain-and-jaw grip which permits working in tight corners, between parallel pipe lines, close to baseboards, or wherever there is but little clearance. It is also possible to tighten and back off a pipe or fitting without taking the wrench from the pipe or changing the setting.

The wrench is versatile in that it will hold and turn any shape . . . round, square, hex or irregular . . . firmly, without play and without crushing. It is currently offered in 10, 14, 18, 24, and 36 in. lengths.

Reed Manufacturing Company, Erie, Pennsylvania.

Cleveland "80" uses long reach, accuracy, teams up with trencher on tough 10-mile job

ON A 10-INCH CAST IRON JOB in Loogootee, Ind. this winter, the contractor matched his Cleveland trencher and Cleveland Model 80 side crane against 10 miles of really rough work. He reports his decision paid off well in both time and money saved.

Cutting the 10-mile line through hilly terrain alongside a curving road, his Cleveland "140" maintained a fast, dependable pace overcoming frost and plenty of Indiana sandstone. Despite the tough digging in close quarters, the "140" left a clean trench ready for pipelaying.

The one-man-operated "80" kept the pipelaying operation up close, usually only a couple of joints behind the trencher. It picked up the pipe strung along the opposite side of the road, turned on its maneuverable full crawlers and accurately positioned the pipe for fast, easy installation. The Model 80's large, easy-acting hydraulic clutches and smooth handling brakes and boom hoist which placed and held pipe exactly to required positions also are responsible for its outstanding speed and accuracy when employed as a backfiller.

Cleveland's perfect operator visibility and well placed foot and hand controls, clearly shown in these photos, keep operators at top efficiency for top production all day long.

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CLEVELAND

Small Ditcher—Barber-Greene

This small, rubber-tired ditcher can be equipped with either of two digging booms; one digging 30 in. deep can be equipped with either a 2¼-in. or 4½-in. bucket line. The other, digging 40-in. deep can be equipped with 2½-in. or 5-in. lines. Switching from one digging width to another involves a change in bucket line, a job that one man, with only hand tools, can perform in 15 to 20 minutes.

The bucket line of the new model consists of a series of replaceable heavy steel cutters, bolted to a steel roller chain, while the digging boom may be set and locked at desired depth and

Here is Barber-Greene Company's newly announced Model 702 rubber tired Ditcher. A versatile and rugged Ditcher which has a wide-spread application as a supplementary machine.

requires no further attention from the operator.

A simple system of rotating paddles and plows places the spoil neatly at the edges of the trench, facilitating backfilling and eliminating the need for a cross conveyor. Especially useful to utilities, the angled construction of the ditcher's boom lets the operator dig under sidewalks and right up to house foundations, minimizing the amount of hand work on the trench.

Control of the machine's crowding speeds, during digging, is by means of a Varidraulic drive which offers an infinite range of speeds from zero to 40 fpm. Self propelled, the machine provides its own on-the-job maneuverability. A tractor type seat lets the operator guide the machine. Travel speed is 240 fpm.

Model 702. Barber-Greene Company, 400 North Highland Avenue, Aurora, Illinois.

Asphaltic Base Coating—Dearborn

Designed for both transmission and distribution lines, this new asphaltic base coating features high electrical insulation properties, and the ability to withstand high and low temperatures. It is applied in combination with glass and asbestos felt wraps. The coating incorporates an inert mineral filler of extremely fine particle size, 425 mesh. Under tests, according to the company, sample strips of the coating have been bent double over a one-inch mandrill at 50 F. It will not sag or flow at high temperatures, nor will it crack at temperatures as low as 20 below zero, the company reports. Standard impact tests have resulted in disbonded areas of less than 3-in. on a 3/32-in. coating.

Pipeline Enamel 240. Dearborn Chemical Company, Merchandise Mart Plaza, Chicago 54.

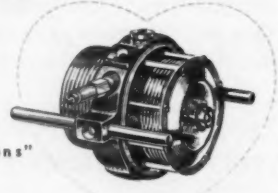
Protective Coating—Amercoat

A high-build protective coating which is said to require only a one-coat application to provide effective corrosion control, this vinyl resin coating can be applied at thicknesses up to 10 mils in one coat. Reportedly combining the density and impermeability of a vinyl coating with the thickness of a mastic, it produces a continuous coating over rivets, welds, angles and edges according to the manufacturer. It is said to provide outstanding resistance to most chemicals, moisture, and severe weathering. A double-pass spray coat produces a film approximately 10 mils thick at a coverage of 50 sq ft per gallon.

Amercoat No. 87. Amercoat Corporation, 4809 Firestone Boulevard, South Gate, California.

BARTON RUPTURE PROOF BELLOWS RECORDERS accurately draw a picture story of flow — liquid-level and/or differential pressure. Operating from 0-20" W. C. min. to 0-400 psid max. at safe working pressures to 3000 psig, and in some cases to 6000 psig with little or no maintenance.

For further information request bulletin 11C-4 or contact BARTON sales engineers, located in most principal cities.

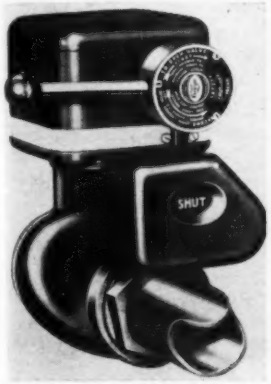


Model 199 Bellows Assembly "The Heart of all Bartons"

BARTON INSTRUMENT CORPORATION
INDUSTRIAL INSTRUMENTS
1429 SOUTH EASTERN AVENUE · LOS ANGELES 22, CALIFORNIA

Reset Valves—Electronic Corporation

These manual reset valves are designed for use with flame failure safe-guard systems in shutting off flow of fuels in cases of faulty operation.



The leakproof closing action of these valves provides maximum protection against burner explosion hazards. Their manual reset mechanism prevents reopening unless electric holding coil is energized. Full area port and straight-through body design offers higher capacities with lower pressure drops. Extra-power holding coils, glass insulated for longer life, are provided, together with corrosion-proofed latching assembly. Available in sizes from 1 in. to 4 in. for use with fuel gases and in 1 in and 1¼ in. sizes for use with oil.

Fireye Series 81G. Combustion Control Division, Electronics Corporation of America, 718 Beacon Street, Boston 15, Massachusetts.

Mangesia Insulation Manual

Revision of the "85 per cent Magnesia Insulation Manual" with 80 pages of text, illustrations and tables has been completed and this second edition offers new engineering and product data. It contains an explanation of chemical and physical properties of 85 per cent Magnesia, together with new conductivity, density, and fire-resistance data. A section is devoted to recommend application techniques for hot piping and equipment.

Magnesia Insulation Manufacturers Association, 1317 F Street, N.W., Washington 4, D. C.

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Gas Industry CALENDAR

AUGUST

15-Sept. 10 Southeastern Gas Association, short course in gas technology, Raleigh, N. C.

29-31 Appalachian gas measurement short course, West Virginia University, Morgantown.

SEPTEMBER

7-9 Mid-West Gas Association, school and conference, Iowa State College, Ames.

9 New Jersey Gas Association, Hotel Monmouth, Spring Lake.

11-13 INGAA, annual membership meeting, Jasper Park Lodge, Jasper National Park, Alberta.

14-15 AGA, accident prevention conference, Marion Hotel, Little Rock, Ark.

15-16 Action demonstration cities, representatives, Lincoln, Nebr.

16-17 Maryland Utilities Association, fall conference, Virginia Beach, Va.

25-30 International Gas Union, 6th conference, Hotel New Yorker, New York.

28 GAMA and AGA, gas industry development committee, New York.

OCTOBER

12-14 GAMA annual meeting, El Mirador, Palm Springs, Calif.

12-14 Wisconsin Utilities Association, electric and gas section, Schroeder Hotel, Milwaukee

17 AGA board of directors, Los Angeles.

17-19 AGA-PCGA joint-convention, Los Angeles.

17-21 National metal show (AGA exhibit) Philadelphia.

18-21 American Dietetic Association, St. Louis (AGA exhibit).

18-22 National Safety Congress, exhibition, Chicago.

19 AGA, industrial gas breakfast, Penn Sherwood Hotel, Philadelphia.

21-Nov. 3 American School Food Service Association, Denver (AGA exhibit).

24-26 American Standards Association, Sheraton Park Hotel, Washington.

24-26 Pacific Coast restaurant convention, Biltmore Hotel, Los Angeles.

24-27 National Association of Railroad & Utilities Commissioners, Ashville, N. C.

NOVEMBER

7-11 National Hotel Exposition, Kingsbridge Armory, New York. (AGA exhibit.)

13-18 ASME, Congress and Hilton hotels, Chicago.

14-17 API, San Francisco.

16-18 Southeastern Gas Association. Roanoke, Va.

28-30 SGA advisory council and management conference, Point Clear, Ala.

JANUARY 1956

10 NEGA, operating division, Hotel Statler, Boston.

23-24 Industrial Heating Equipment Association, LaSalle Hotel, Chicago.

FEBRUARY 1956

6-10 Western Winter Radio-Television and Appliance Market, Western Merchandise Mart, San Francisco.

MARCH 1956

12-16 National Association of Corrosion Engineers. Hotel Statler, New York.

19-21 Mid-West Gas Association, Hotel Fontenelle, Omaha, Nebr.

22-23 NEGA, annual meeting, Hotel Statler, Boston.

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